Converting the Cold War Economy

Investing In Industries, Workers, and Communities

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Executive Summary

The end of the cold war enables the United States to cut military spending by half over the next decade. The potential "peace dividend" resulting from such a policy would reach $140 billion per year. It goes without saying that such resources are badly needed for many tasks: bolstering education, augmenting infrastructure, revitalizing manufacturing, and reducing budget deficits. But the successful redirection of military spending is bedeviled by the economic and political hazards of unemployment and recession. Deliberate, concerted action is required to shake the dependence of our economy on Pentagon dollars without the worst "cold turkey" symptoms afflicting our industries, workers and communities.

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Lessons on how to ease the transition can be drawn from the past fifty years of cold war military preparedness. The Federal government's creation of guaranteed markets and its provision of research and development funds ensured the spectacular success of a small group of American industries — aerospace, communications and electronics — in the civilian and military arenas. These industries provided the lion's share of U.S. manufacturing growth and net export earnings in the past few decades. They benefited from a public industrial policy, confirming that government economic guidance can work.

Such accomplishments notwithstanding, a Pentagon-led industrial policy subordinate to cold war military missions was neither efficient nor, in the long run, capable of sustaining innovation and competitiveness in American industry. A group of privileged firms evolved in relative isolation from the discipline of market competition. Their planning, production, and marketing practices diverged increasingly from those rewarded in civilian markets. The ranks of certain occupations, especially in science and engineering, became swollen and defense-dependent, drawing talent away from civilian sectors. More-

over, military production was highly concentrated in particular regions and communities, heightening their vulnerability to cuts and fueling political resistance to the efficient use of resources in the defense sector.

Conversion planning has become an increasingly essential ingredient in the effort to restructure the federal budget. New funds have been appropriated by Congress — $200 million in 1990, and $1 billion in 1992. Thus far, however, the money has been sluggishly dispersed by a reluctant Department of Defense; it has only just begun to reach businesses and workers. Some funds have been dedicated to worker retraining, a smaller amount goes for economic development planning, and in 1992 a large amount will be earmarked for new technology initiatives.

Conversion is an increasingly essential ingredient in the effort to restructure the federal budget.

Three crucial steps should be taken by the federal government to institute an effective conversion process.

First, new directives and support for facility-based conversion planning, applicable to military bases and defense plants, could expedite the reuse of valuable human and physical capital. Such conversion planning should be a requirement for receipt of military contracts and should encompass employee representatives, local economic development agents, and community members. Outside technical assistance for business planning, marketing and finance should be made available to companies, local reuse coalitions, and base closure groups. Only when contractors have workable plans for periods of reduced demand for defense goods will we be able to cut spending judiciously and preserve the defense industrial base.

Second, the major conduit for publicly-underwritten technological innovation and industrial policy should switch from defense to new missions in such areas as the environment, transportation, housing, alternative energy, and infrastructure. Commitments to frontiers like non-fuel vehicles, solid waste management, mass transit, and renewable energy should include R&D support and stabilization of markets in the infant-industry stage. Firms in the throes of conversion would then be encouraged to bid for contracts in these new areas.

Third, an Office of Economic Conversion should be established as a highly visible and self-liquidating agency responsible to the Resident. It would marshal and update existing but currently inaccessible federal databases on military spending and its impacts on firms, workers and communities; operate an early warning system on shut-downs of defense plants and military bases; act as an agency of first resort, advising communities and firms anticipating defense cuts of the many federal programs available; and conduct high-quality research on such key components of the conversion process as defense worker retraining programs, community economic development planning grants, and the Defense Department's planning and technical assistance programs. Above all, it would coordinate a series of task forces and other bodies to advise the President, Congress, and state and local governments on the most efficient way to achieve and harness the peace dividend.

An Office of Economic Conversion should be established as a highly visible and self liquidating agency responsible to the President.

All of these features were present in the planning for the post-World War II era, which was a much greater adjustment than we face today. After the Korean and Viet Nam wars, in contrast, large defense cuts contributed to recessions because the World War II planning apparatus had been dismantled. As a fragile American economy limps along, an effective conversion program is a necessity to shepherd precious national resources from cold war preparedness to the new industries and infrastructure which will enable the nation to prosper in an integrated world economy.

and of civilian defense department employees, unemployment pressures could flatten a fundamentally weak economy. This was the finding of the Congressional Budget Office (CBO), which explicitly stated that applying the peace dividend to deficit reduction could adversely affect the economy in the short run, lowering GNP and employment.'

Experience casts doubt on the ease of moving displaced defense resources into commercial endeavors that can succeed in today's increasingly competitive markets. Since the onset of the cold war, the industries, firms, and workers devoted to the production of cold war weaponry have operated behind a "wall of separation" from competitive, consumer-oriented commerce (Markusen and Yudken, 1992, Chapters 4, 7). The consequence is a corporate culture in the defense industry that will have great difficulty shifting gears.

The Congressional Budget Office stated that applying the peace dividend to deficit reduction could adversely affect the economy in the short run.

For 40 years the noncompetitive defense economy has been nurtured by a de facto industrial policy; particularly favored were the aerospace, communications, and electronics ("ACE") industries. Lack of equivalent assistance for the commercial sectors of the economy (auto, steel, machinery, consumer electronics) in the form of research and development subsidies, guaranteed markets, import protection, and company bail-outs have rendered them less prepared for the infusion of new resources.

It would be neither equitable nor efficient for the nation to undertake big defense cuts without a well-developed conversion plan. The hardship of transition would not be spread evenly. Opportunities for employment and training that the armed services provide many young Americans, especially minorities, could be lost. Nor would it be economical for the nation to idle civilian manpower and manufacturing capacity until markets absorb the freed-up workers and resources.

This report first reviews pending defense cuts and projects their economic impact, then explains how the nature of the defense industry makes restructuring difficult. Recent efforts to convert military-related industries are surveyed, and the likelihood of successful conversion under current institutional

Introduction

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Over the next ten years the decrease in defense spending will accelerate. As a result, there will be many fewer soldiers, civilian defense workers, and military bases: procurement of weapons will diminish. Because the cold war has ended, the military budget could be cut by at least 50 percent (Kaufmann and Steinbnmer, 1991; U.S. Congress, Office of Technology Assessment (OTA), 199 1). As many as 2.5 million workers now employed on military bases, in Department of Defense offices, and in defense plants could be let go. The nation's hunger for budget savings, in order to finance incremental public spending, tax cuts, or deficit reduction, will exert steadily increasing pressure on the defense budget.

This study addresses the fundamental concern of how to minimize the costs of shifting workers and resources from publicly financed military missions to distinctly different activities, such as competitive, market-driven enterprises.

The costs of re-allocating resources in the coming decade of industrial restructuring include the perils to workers' families of switching jobs in a fundamentally weak economy, the risks of reorganizing business firms to produce nondefense goods and services, the disruption of communities that are dependent on defense production and facilities, and the loss of output to the economy as a whole.

The expectation is that the private sector will routinely and swiftly replace jobs or income losses caused by reduced military spending (U.S. Department of Defense, 1991). Discounting the extent of adjustment problems, the Administration plans to use most of the defense savings for deficit reduction and tax cuts.

It is increasingly apparent, however, that significant harm will ensue from further cuts in the defense budget. Without planning for the future uses of defense plants and their workers, of military bases and members of the armed services,

arrangements is assessed. Finally, the policy implications are discussed. We derive the following principal conclusions from our analysis:

- To achieve both peace and a revitalized civilian economy, the conversion of cold war industries to civilian production cannot be left to fate; it must be tackled explicitly in public policy.

- New peacetime, public missions in the fields of environmental protection, health care, housing, transportation, and energy, alongwith investments in infrastructure and education, should be undertaken.

- An accountable and self-liquidating *Office of Economic* Conversion should be created; it would take over the Department of Defense's current function of coordinating the planning and distribution of aid to military industries, defense workers, and their associated communities.

- State and local governments have in many cases pioneered innovative conversion efforts; their roles should be preserved. A large Washington bureaucracy should be avoided.

An Office of Economic Conversion could link under-utilized facilities, firms. and workers to the new missions.

Our approach addresses the need for a market for the new civilian goods and services that re-deployed workers and firms will produce. It will also guide new research and development efforts, supplanting the de facto industrial policy implied by past defense budgets. An Office of Economic Conversion could link specific under-utilized facilities, firms, and workers to the new missions. Communities could be preserved by maximizing the extent to which new jobs are directed toward workers idled by defense cuts. Given the obvious problem of low employment levels among nondefense workers, a conversion plan must be wedded to a general commitment to full employment. The latter problem is beyond the scope of this report, but clearly a successful full employment policy must include effective conversion.

The Nature of the Adjustment Problem

This section begins with an update on the state of planning for defense cuts. It then addresses the economic impacts of the cuts in the light of, first, the standard criteria of GNP and employment and, second, the historic industrial policy favoring defense industries. Problems facing the key actors in the defense sector — firms , workers, and communities — are also surveyed.

Declines in outlays, which lag cuts in budget authority, will accelerate in *coming years.*

The Tenable Range of Defense Cuts

Ronald Reagan's rash expansion of the military budget during the 1980s has paved the way for the impending crisis in the defense industry. The 50 percent real increase in military budgets between 1980 and 1985 was an unprecedented peacetime build-up which will oblige a proportionately hasty decline.

Although the decision to begin cutting military spending was set in 1985, lags in the procurement process and backlogged programs precluded declines in real defense outlays until 1989 (U.S. Congress, Congressional Budget Office, 1992, p. 2). From 1989 to 199 1, excluding the cost of the Iraq war, defense budget authority[2] fell 10.3 percent in real terms (Defense Budget Project, 1991b, pp. 5-6).

Declines in outlays, which lag cuts in budget authority, will accelerate in coming years. The Bush plan for 1991 through 1997 would result in additional cuts of 11 percent in real outlays, while proposals by moderate Democrats would result in a further 20 percent reduction (U.S. Congress, Congressional Budget Office, 1992, p. 10). Under administration plans, by 1995 the number of active-duty soldiers would be cut by 20 percent (Cheney, 199 lb, p. 14), suggesting further long-term cost reductions.

Total costs for the planned closure of 43 bases and realignment[3] of 28 others is estimated to be $5.7 billion between 1992 and 1997. These costs may be offset by the sale of land

and property. Total savings between 1992 and 1997 are expected to be $6.5 billion. The annual recurring savings beginning in Fiscal Year 1998 will be approximately $1.7 billion (Department of Defense, 1991, p. 1).[4] This is in addition to the base closures contained in the 1988 base closure list, whose savings were estimated to average an annual level of $693.6 million (Congressional Quarterly, 1988, p. 447).

Cuts in high-tech weapons procurement, including Trident submarines, the rail garrison MX system, the M-l tank, the Apache attack helicopter, the F- 16 Falcon fighter, and the B-2 bomber have promised substantial reductions in budget authority over the past three fiscal years (Defense Budget Project, 1992, Table 9). The cuts to date constitute a minimum threshold for the potential peace dividend. Members of Congress who supported the Reagan build-up have acknowledged that the defense budget is in a state of "free fall."

Defense cuts to date, reflect budgefaty compulsion rather than rational planning for the post-co/d war world.

This reality notwithstanding, there appears to be some wishful thinking at the Pentagon that new missions and higher spending levels can be adopted in the future. To pursue a new policy shift toward the role of international policeman of the "New World Order" and to prepare for anticipated future "mid-intensity conflicts" (such as the war against Iraq), the administration looks forward to a 10 percent increase in military R&D spending in 1992, followed by increased procurement of new weapons.

Defense cuts to date, limited though they may have been, reflect budgetary compulsion rather than rational planning for the post-cold war world. Several proposals for "threat-based planning" and "cooperative security futures"[5] suggest that the cuts could be much deeper. For instance, a threat-based analysis by Rep. Les Aspin suggests that the budget could be cut from its current level of $281 billion (the 199 1 Bush proposal) to $200 billion (Aspin, 1992; Forsberg, 1992). Kaufmann and Steinbruner (199 1) suggest that the cooperative security option would permit real defense budgets as low as $147 billion by 2001 (see also, U.S. Congress, Office of Technology Assessment, 1991, p. 14).

Deeper cuts resulting in budgets as low as $67 billion a year are conceivable if the U.S. were to defer preparations for unilateral action in favor of a cooperative approach to security based on the United Nations, and if arms sales by the major industrialized countries to the Third World were stopped (Forsberg, 1992, p. 17).[6] The gap between these projections and Secretary Cheney's planned $244 billion signals substantial leeway in the likely size of the peace dividend and thus the extent of its effects on the economy.

Economic Effects of Defense Cuts

Deeper cuts resulting in budgets as low as $67 billion a year are conceivable if the U.S. were to defer preperations for unilateral action.

The difficulty of absorbing a peace dividend, which could range from $300 billion to $1 trillion dollars over the decade, is the subject of diverse studies. Some writers minimize the adjustment problem. Murray Weidenbaum, President Reagan's first chairman of the Council of Economic Advisors, argues for a "do nothing" strategy under which defense savings would simply be channeled to deficit reductions (Weidenbaum, 1992). He expects lower deficits to decrease interest rates and to boost investment and jobs. The same prescription is offered by the Bush administration, whose only conversion policy to date appears to be the energetic acceleration of arms sales abroad.[7]

Underlying the implied chain of causation-from deficit reduction to low interest rates to higher private investment to stronger economic growth-is a sanguine attitude towards full employment. The obvious problem is that deficit decreases could depress employment. Lower employment could overwhelm any positive spur to investment attributable to lower interest rates because business firms may be more worried about low expected sales than they are encouraged by low interest rates. Furthermore, lower interest rates do not ensure that borrowed money will be invested in the American economy. Firms could just as easily borrow to open plants in Mexico or Singapore.

Another problem is that the relationship between deficits and interest rates is not straightforward. The Federal Reserve Bank sets interest rates, and its preoccupation with the control of inflation has permitted relatively high real interest rates.[8]

The comparative merits of deficit reduction, tax cuts, and public investment lie at the heart of the current debate about economic policy. Skepticism about the efficacy of deficit reduction or tax cuts leads a number of analysts to argue that savings from the peace dividend should be used for increased public spending on infrastructure, education, and industrial policy initiatives (Faux and Sawicky, 1990; Eisner, 1990). Many economists committed to deficit reduction advocate extra caution in times of low employment, including the current period.[9]

The relationship between deficits and interest rates is not straightforward. The Federal Reserve Bank sets interest rates, and its preoccupation with the control of inflation has permitted relatively high real interest rates.

Because the role of defense spending in the prosperity of the 1980s is not well recognized, the difficulties in adjusting to defense cuts of comparable magnitudes are commonly understated. For a number of reasons, military outlays in the 1980s may have been a more potent economic stimulus than other types of deficit-financed public expenditure.

Reagan-era defense budgets emulated the cold war emphasis on advanced technology, pouring resources into research, development, testing, evaluation, and procurement of new weapons systems (and sometimes not quite in that order). As a consequence, fully 57 percent of all private sector, defense-generated employment is in manufacturing, compared_ with only 17 percent in the economy as a whole (U.S. Congress, Office of Technology Assessment, 1992, p. 18).

This injection of manufacturing jobs masked the massive, concurrent forfeiture of similar jobs in the civilian sector. While a net of one million manufacturing jobs were lost in those five years, defense manufacturing added 600,000 jobs. Thus for every three jobs destroyed in nonmilitary manufacturing, defense spending added one (Henry and Oliver 1987, p. 8). The new military-oriented jobs offered good pay and benefits, counteracting the erosion in middle-income jobs elsewhere in the economy. [10]

Public spending on weapons systems keeps dollar flows in the United States. The Pentagon buys American, requires high domestic content, and pays for the construction of new

plants if no domestic suppliers exist. [11] Less of the defense dollar leaks out of the economy in the form of imports, and thus more domestic jobs and income are generated. In contrast, fiscal policies based on tax cuts trickle down to create lower-paying service jobs and higher levels of imports, mirroring current unguided trends in the economy. Social spending increases that offset defense cuts might do no more than replace manufacturing jobs with lower-paying service employment, unless steps to modify such a result are taken.

Given the stimulative virtues of defense spending, the roots of the current recession are more evident. After defense outlays peaked in 1989, the impetus for growth evaporated. If future defense cuts are not offset by other forms of government spending, they will most likely deepen the recession and jeopardize any conceivable recovery. The Congressional Budget Office reports that the Bush cuts proposed in February of 1992 would *reduce GNP in each of the next five years* (U.S. Congress, Congressional Budget Office, 1992, Tables 4 and 5). [12] If the cuts are increased to levels many believe appropriate, the extent of economic decline would of course be compounded.

The history of defense cuts suggest that the "do nothing" strategy is a formula for failure. Post- World War II adjustment, the largest before of since, had been planned since 7 943.

The history of defense cuts suggest that the "do nothing" strategy is a formula for failure. Post-World War II adjustment, the largest before or since, had been planned since 1943. The Federal government offered generous incentives to companies to re-tool and provided educational opportunities to returning soldiers through the GI Bill.

Although military spending as a percent of GNP plunged from 39 percent to 3 percent, unemployment after World War II only reached 4 percent, far below the 15 percent of 1940. Almost 25 million defense workers, soldiers and civilian defense employees were reabsorbed into the economy (U.S. Congress, Office. of Technology Assessment, 1992, p. 6).

In contrast, recessions followed the close of U.S. large-scale military operations in both Korea and Viet Nam. Real public spendingwas cut by 10 percent between 1954 and 1957. No adjustment programs were in place, and unemployment rose to almost 7 percent (in those days, such a level was

considered alarming). After Viet Nam, President Richard Nixon rejected President Lyndon Johnson's plans for compensatory fiscal policies. In the ensuing 1970- 197 1 recession, the jobless, rate almost doubled. In each case, projected short-term budget surpluses were precluded by subsequent revenue losses and escalation in social spending increases (U.S. Congress, Office of Technology Assessment, 1992, pp. 7-8). In other words, prospective budget savings that would have been expected to decrease interest rates and stimulate private investment and economic growth were foreclosed by the negative economic stimulus of the spending decreases. Less consumption did not lead to more savings; it led to less savings.

*Beyond the near term, most analysts agree that a **shift from** defense to other public or private sector output would be a **net** gain for the economy.*

Beyond the near term, most analysts agree that a shift from defense to other public or private sector output would be a net gain for the economy (Wynne, 199 1; Anderson, Bischak, and Oden, 199 1; Bezdek, 1975). But in the short and even medium term, substantial barriers confront the flow of human and physical capital resources from one sector to another. The cost of transition is the issue. Because a great deal of procurement spending is heavily concentrated in certain industries, firms, and regions, it will be all the more difficult for adjustment to take place (Markusen, Hall, Deitrick, and Campbell, 1992; Whitehead, 199 1).

Possible adjustment failure in the 1990s should be taken seriously. Employment in defense industries, the armed services, and the Department of Defense could plunge from today's 6 million to 3.5 million by 200 1, an average loss of 250,000 jobs a year. Total job loss could reach 1 .O to 1.4 million by 1995, and 2.3 to 2.5 million by 2001 (U.S. Congress, Office of Technology Assessment, 1992, pp. 5, 9). These people would be released into a labor market which presently harbors millions of unemployed workers.

Jobs will not be readily forthcoming in nondefense sectors for some time. In civilian manufacturing, structural difficulties have been obscured by defense-fed vigor in aircraft, electronics, and communications. Indeed, an appreciation of the effect of the Pentagon's quiet industrial policy on its

beneficiaries and those denied its largesse illuminates the adjustment issue.

Industrial Policy, American Style

During the cold war a unique new group of private sector companies took over the production of advanced weaponry, and in so doing became powerful shapers of innovation in the economy. These companies constituted a new ACE complex of industries which benefited from a rich and prolonged diet of government contracts for R&D and procurement. ACE was able to buy the latest machinery and attract the best talent, the latter, often educated in leading engineering schools at public expense. ACE enjoyed all the protection and favors that industrial policy confers in other countries: R&D, guaranteed markets, trade protection, funds for the purchase of plant and equipment, and bail-outs in times of financial trouble (Markusen, 1986).

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Prior to World War II, arms development and much production was either reserved for government laboratories and arsenals, or was undertaken by companies in steel, autos, shipbuilding, and chemicals that also served civilian markets. In contrast, during the cold war the older American industries found themselves bereft of such patronage and beleaguered by growing competition from new plants in reconstructed Japan and Germany, and later, in the newly industrialized countries of Taiwan, Singapore, South Korea, and Malaysia.

ACE's favored status was not attained without cost. By 1980 the pro-ACE industrial policy had left the American economy with structural deformities which would be accentuated by Reagan's defense build-up. Firms that concentrated on servicing defense contracts came to be less equipped to transform themselves into viable commercial enterprises. This "defense dependency" of many American industries rose dramatically **(Table 1).** The proportion of industries with at least 10 percent of their output devoted to Department of Defense orders (not including the military portion of NASA or foreign military sales) more than doubled from 1977 to 1985.

TABLE 1
Growth in DOD Sales and Dependency, 1980- 1985

Industrv	Growth in Military Output 1980- 1985	Military Share of Output 1980	1985	Military output (billions 1977 dollars) 1985
Shipbuilding	42%	61%	93%	$5.8
Ammunition, Large	98	88	88	1.1
Ordnance	83	79	86	0.8
Missiles	65	69	84	5.3
Air, Missile Engines	69	44	78	5.9
Tanks	110	68	69	1.1
Aircraft	80	37	66	11.7
Explosives	22	41	65	0.2
Communications Equipment	73	42	50	15.7
Air, Missile Parts	67	31	41	4.5
Ammunition, Small	51	30	39	0.2
Machine Tools, Cutting	25	8	34	0.4
Truck Trailers	114	10	29	0.4
Engineering Instruments	55	23	28	0.7
Electronic Tubes	75	14	26	0.3
Optical Instruments	189	13	24	0.9
Aluminum, Primary	67	9	22	0.6
Turbines	55	7	23	0.3
Industrial Trucks	54	8	22	0.2
Electronic Components	76	16	20	3.0
Steel Mills	63	6	12	3.4
Petroleum, Crude	48	n/a	10	4.3
Air Transportation	58	n/a	8	3.0
Railroads	67	n/a	7	1.5
Oil Refining	33	4	6	5.2
Computers	92	5	5	2.3
Industrial Chemicals	54	4	5	2.0
Semiconductors	60	9	5	1.6
Real Estate	5	n/a	5	2.7
Automobiles	120	3	3	2.6
Wholesale Trade	62	n/a	2	6.3

Source: Compiled by Ann Markusen from Henry and Oliver, 1987. Unpublished data from the Department of Commerce, 1987. Chart contains all industries with greater than $1 .0 billion in sales (in real 1977 dollars) plus all those with more than $200 million in defense sales and more than 20% defense dependency in 1985. These figures do not include military related output for NASA, the Department of Energy or exports.

Some industries registered stunning shifts in their orientation due to growth in military contracts and decline of commercial markets. Shipbuilding, including renovation and repair, was 45 percent defense-dependent in 1977 and 93 percent in 1985. Aircraft went from 43 percent to 66 percent in the same period (Henry and Oliver, 1987, pp. 5-6). Radio and television communications equipment received $15.7 billion in government sales in 1985, reflecting a 73 percent increase since 1980, and increased its defense dependency from 42 percent to 50 percent.

In the 1980s some of the more traditional industries found their dependency on military sales increasing because their commercial markets eroded. For instance, output in the machine tool industry declined by 60 percent between 1980 and 1985. But since military orders increased by 65 percent, the ratio of defense dependency for these tool makers rose from just 3 percent in 1977 to 34 percent in 1985. Similarly, the military's hold on industrial trucks shifted from 2 percent to 22 percent in the same period. In these industries absolute declines coupled with rising military orders meant a large net shift in orientation toward the Pentagon (Henry and Oliver, 1987, pp. 6-7).

*In the **1980s** some of fhe more **traditional** industries found their dependency on military sales increasing because their commercial markets eroded.*

Some of the greatest beneficiaries of the defense buildup were new producer goods industries whose commercial competitiveness, after three decades of government nurturing, permitted them strong showings in nonmilitary sales as well. Despite a dramatic rise in military orders, the military dependency of this group did not rise nearly as much. The computer industry, for instance, enjoyed some $2.3 billion (in 1977 dollars) a year in military orders by the mid-1980s, but its military share rose only modestly from 3.6 percent in 1980 to 5 percent in 1985.

In general the gulf between the ACE industries' taxpayer-funded R&D receipts and those of civilian industries was enormous and persistent. Reflecting a pattern developed over four decades, the aerospace industry enjoyed $15.6 billion in federal R&D contracts in 1989, while the steel industry received only $2 1 million in public funds **(Table** 2). The ACE complex

Table 2
Federal vs. Industry R&D Funding
for Selected Industries, 1989
(million dollars)

Industry	Federal	Industry	Total	Federal
Aerospace	$15,647	$3,511	$19,157	82%
Electronics, Communications	7.928	10,618	18,546	43
Rubber Products	313	930	1,243	25
Autos, Trucks, Railroad (Including Tanks)	1,982	9,431	11,413	17
Scientific Instruments	991	5,531	6,522	15
Machinery (Including Computers)	1,669	10,457	12,126	14
Fabricated Metals	73	732	805	9
Iron and Steel	21	601	622	3
Chemicals	381	11,134	111,515	3
Petroleum Products	21	2,068	2,089	1
Food and Beverage	0	1,172	1,172	0
Paper/Pulp	0	1,009	1,009	0
Textiles	0	176	176	0
Manufacturing	29,223	59,648	88,871	33

Source: Compiled by Ann Markusen from *Aerospace Facts and figures, 1989/1990*, Aerospace industries Association of America, Washington, DC: AIA, 1989,104.

Large differentials in industrial growth rates over the past coup/e of decades confirm the stimuli of government defense-related R&D and procurement.

accounted for a whopping 8 1 percent of all federal funding for manufacturing R&D. While the aerospace industry spent only slightly more of its own R&D funds as a percent of sales than did the average manufacturing firm (3.7 percent and 3.2 percent, respectively), its total R&D funding as percent of sales (15 percent) was three times the 5 percent rate for all manufacturing, the gap being almost entirely due to Pentagon subsidies (Aerospace Industries Association of America, 1989, pp. 104-5).

Large differentials in industrial growth rates over the past couple of decades confirm the stimuli of government defense-related R&D and procurement. From 1979 through 1986, the four fastest-growing manufacturing sectors were major, long-standing beneficiaries of defense spending. In an era when manufacturing's share of GNP was constant, industries like nonelectrical machinery and electronics increased their shares by more than 20 percent. Producers of autos, steel,

petroleum, and leather goods had share losses in excess of 20 percent.

Success in selling to the Pentagon is mirrored in military sales to foreign governments. The top U.S. net exporting industries in 1987 were those with either a relatively high degree of defense dependency or, in the case of chemicals and computers, large defense receipts[13] and disproportionate shares of military R&D **(Table 3).** Military demand from abroad remains quite substantial. The domestic aircraft industry, for instance, which received $63 billion in new sales from DOD in 1988, won another $7 billion in foreign military sales. In 1989 U.S. firms sold over $15 billion in armaments to more than 130 nations and territories, while several billion more undoubtedly flowed through covert channels (Hartung, 199 1, p. 1). In 199 1 arms exports had exploded to $41 billion and permits for an additional $63 billion had been issued. These industries' ability to export is the product of "constructed" comparative advantage in commercial markets, induced by government-underwritten research and scale economies achievable with high government levels of demand.

The ACE industries garnered the fruits of American industrial policy in the post-World War II period.

The ACE industries garnered the fruits of American industrial policy in the post-World War II period (Markusen, 1986, 1989). The strong correlation between Pentagon patronage and the ability of a firm to innovate and export in commercial markets in aerospace/electronics/communications demonstrates as powerfully as the Japanese and European models do that concerted government nurturing does indeed augment international competitiveness.

At the same time, without the benefit of public industrial aid, firms' capacity to change to production for nonmilitary, nongovernmental customers will be inhibited by the extent of defense dependency. This is because doing business with the Pentagon differs from other forms of commerce.

Behind the Wall of Separation: Business Without Markets

Critics of the military have long argued that defense-dependent companies perforrn inefficiently because they oper-

Table 3
Trade Balance in Selected Manufacturing Industries, 1987
(billion dollars)

Industry	1987
Total Manufacturing	*$137.7*
Aircraft and Other Transportation Equipment	*12.5*
Chemicals	*9.6*
Professional, Scientific and Control Instruments	*3.0*
Military Arms, Ammunition, Vehicles	*2.0*
Computing and Office Machinery	1.0
Furniture and Parts	*-4.4*
Industrial Machinery	*-6.7*
Semiconductors and Other Electrical Equipment	*-7.0*
Iron and Steel	*-8.5*
Telecommunications and Sound Reproducing Equipment	-15.6
Wearing Apparel and Accessories	-16.9
Motor Vehicles	*-53.3*

Sources: U.S. Department of Commerce, Office of Trade and Investment Analysis, Unpublished data. Compiled by the Office of Technology Assessment, U.S. Congress. *Paying the Bill: Manufacturing and America's Trade Deficit.* Washington, DC: Government Printing Office, June 1988: Table 12.

*The business culture of the ACE complex differs **radically** from **that** in market-driven, civilian industries.*

ate outside of market discipline. In their view military procurement has fostered inefficient production practices in the American economy that exacerbate the effects of lowered military spending (Melman, 1974). Cost overruns, excessive salaries, and corruption are charges perennially directed against military contractors.

There is evidence for these charges, [14] but they are symptoms of a more profound malady. The business culture of the ACE complex differs radically from that in market-driven, civilian industries. At the individual firm level, success in commercial aerospace markets has generally been incompatible with success in producing for the military. Several companies have foundered in the effort to serve both. Of the big three aircraft companies, for instance, only Boeing has been able to sell to nondefense customers; Lockheed has failed and McDonnell-Douglas has faltered.

Prime contractors of all sizes have ended up serving the Pentagon almost exclusively—General Dynamics and Northrup, for example. But those who manage to sell to both spheres

dedicate entirely different divisions to each market. Within such companies, there is little mobility of either personnel or product ideas from the military to the commercial sphere (U.S. Congress, Office of Technology Assessment, 1989, pp. 229-230).

The differences between serving military and commercial markets go beyond deficiencies in marketing to the basic way in which production is organized. In cost-conscious mass production, the firm is geared to produce large volume at low unit prices. The military-oriented aerospace firms have tailored their organizations to design a relatively small number of large-scale systems of considerable technical complexity. Cost considerations are less important than performance and timeliness of delivery (Weidenbaum, 1970, p. 10 1).

Flexibility in serving both markefs has been further limited by fhe ***entrenched oligopoly*** *that has grown up on the* ***military side*** *of the wall.*

Flexibility in serving both markets has been further limited by the entrenched oligopoly that has grown up on the military side of the wall. Successful contractors are relatively few in number. Over the post-war period, remarkable stability has characterized the ranks of military-industrial companies. Few have left the business, with mergers and acquisitions accounting for the most disappearances from the ranks of the top 25. The top 10 firms in 1988 garnered more than one-third of all DOD prime contracts, for a total of $47 billion dollars **(Table 4).** Contracts for NASA and for DOD research, development, testing, and evaluation were also concentrated **(Table 5** and **Table** 6). For individual weapons systems, dominance is more marked; between three and seven contractors, and often no more than one, typically bid on any particular project. While concentration is also a trait of American markets generally-in 1975, 111 firms made more than half of total U.S. sales-it is much higher in military spheres than in most others. In addition, commercial firms are disciplined to some extent by the competitive threat of imports.

These aspects of dependency are understated to the extent that companies are exporters of military equipment to parties other than the U.S. government. Military aerospace exports reached $8 billion in 1987, more than the entire NASA budget. For every dollar spent for aircraft equipment by the

Table 4
Department Of Defense Top Military Contractors, 1988
(million dollars)

Rank	Company	Primes	Percent of U.S. Total
1	McDonnell Douglas	$8,003	6%
2	General Dynamics	6,522	5
3	General Electric	5,701	4
4	Tenneco	5,058	4
5	Raytheon	4,055	3
6	Martin Marietta	3,715	3
7	General Motors	3,550	3
8	Lockheed Aircraft	3,538	3
9	United Technologies	3,508	3
10	Boeing	3,018	2
11	Grumman	2,848	2
12	Litton Industries	2,561	2
13	Westinghouse Electric	2,185	2
14	Rockwell International	2,184	2
15	Unisys	1,380	1
16	Honeywell	1,366	1
17	Textron	1,276	1
18	TRW	1,250	1
19	Texas Instruments	1,232	1
20	IBM	1,065	1
21	LTV	942	1
22	FMC	862	1
23	Ford Motors	791	
24	Singer	785	
25	I-I-r	769	1
	Top 25 Contractors	68,164	50
	U.S. Total	137,049	100

Source: Compiled by Ann Markusen from *Aerospace Facts and figures, 1989/1990,* Aerospace Industries Association of America, Inc., Washington, DC, 1989.

U.S. government in 1987, the aerospace industry received another 22 cents in orders from other governments. In addition, illegal sales via private arms traders add to military dependency but are impossible to gauge accurately. Returns on illegal exports are believed to be about 2.5 times as profitable as military sales to the U.S. government.

Evidence from the recent rounds of defense cuts does not bode well for much larger cuts anticipated in years to come.

Table 5
NASA Top Contractors, 1988
(million dollars)

Rank	Company	Procument	Percent of U.S. Total
1	Rockwell International	$1,714	24%
2	Lockheed	793	11
3	Thiokol	423	6
4	Martin Marietta	341	5
5	McDonnell Douglass	299	4
6	Boeing	260	4
7	General Electric	211	3
a	United Space Boosters	191	3
9	EG&G Florida	156	2
10	Bendix	152	2
11	Computer Sciences	151	2
12	TRW	143	2
13	Ford Aerospace & Communications	137	2
14	United Technologies	91	1
15	IBM	a7	1
16	Contel	76	1
17	Grumman Aerospace	74	1
18	Pan American World Services	70	1
19	Planning Research	47	1
20	Boeing Technical Operations	42	1
21	Teledyne Industries	40	1
22	BAMSI	40	1
23	Raytheon Service	38	1
24	Sverdrup Technology	38	1
25	Perkin Elmer	31	0
	Top 25 Contractors	5,645	78
	U.S. Total	7,275	100

Source: Compiled by Ann Markusen from *Aerospace facts and Figures, 1989/* 1990, Aerospace Industries Association of America, Inc., Washington, DC, 1989.

Many defense firms were forced to write off large losses in the late 1980s, a result not only of costly DOD directives but also of the inability to exploit commercial applications of military technology (U.S. Congress, Office of Technology Assessment, 199 1, p. 14). Many companies who tried diversification failed to compete with existing commercially-oriented firms whose cost consciousness and marketing expertise gave them a

Table 6
RDT&E Awards For DoD Top 25 Contractors, 1984-1987
(thousand dollars)

Rank	Company	1984	1985	1986	1987	Percent of Total 1987
1	McDonnell Douglas	$588,448	$669,141	$928,015	$ 1.669.268	7.65%
2	General Dynamics	695,923	483,730	289,920	334,185	1.53
3	General Electric	848,238	885,353	724,518	784,439	3.60
4	Tenneco	·	·	·		n/a
5	Raytheon	408,161	352,048	323,087	593,788	2.72
6	Martin Marietta	813,576	911,336	1,337,572	1,607,590	7.37
7	General Motors**	575,936	474,850	460.4 18	394,699	1.81
8	Lockheed Aircraft	1,232,933	1,647,388	1,67 1,250	1,630,503	7.48
9	United Technology"	254,772	344,604	399,530	28 1,940	1.29
10	Boeing	1,788,529	1,069,942	1,119,824	1,223,459	5.61
11	Grumman	219,824	472,884	910,312	901,517	4.13
12	Litton Industries		1,547	1,767	7,698	0.04
13	Westinghouse Electric	523,133	519,238	356,612	385,060	1.77
14	Rockwell International	954,037	624,753	620,945	493,967	2.26
15	Unisys**	443,666	38 1,378	24 1,320	175,902	0.81
16	Honeywell	246,249	243,010	288,987	340,468	1.56
17	Textron**		177,111	147,245	141,805	0.65
18	TRW	455,373	337,572	536,457	556,580	2.55
19	Texas Instruments		205,157	123,650	112,982	0.52
20	IBM	315,114	557,713	494,569	470,922	2.16
21	LTV	187,599	154,881	280,333	253,044	1.16
22	FMC	22,583	36,093	116,346	100,800	0.46
23	Ford Motor	159,512	239,278	230,698	172,143	0.79
24	Singer		89,784	163,168	146,761	0.67
25	III		211,701	118,761	163,362	0.75
	U.S. Total		18,938,442	19,811,808	21,809,069	
	Share of Top 5 in Total		12.62%	11.44%	5.51%	
	Share of Top 10 in Total		36.11	36.62	39.07	
	Share of Top 20 in Total		54.70	55.40	55.51	
	Share of Top 25 in Total		58.56	59.99	59.35	

Source: Compiled by Ann Markusen from '500 Contractors Receiving the Largest Dollar Volume Contract Awards for RDT&E," various years. Department of Defense.

*Not within the top 500 contractors receiving prime contract for RDT&E.

**These are contemporary designations of firms. Totals for earlier years include those of constituent companies which later merged.

considerable lead. Firms interviewed concede that layoffs and plant closings will be the most likely response to significant cuts. Some, like General Dynamics, have a well-publicized policy of hunkering down and waiting for the military budget to rise again, spending their energies lobbying for restoration of weapons funding rather than taking the riskier road of new, commercial product development (Markusen and Yudken, 1992, Chapter 8). Companies who convert voluntarily usually have some distinct advantage. For example, Hughes Aircraft is entering the electric car field with a ready market provided by its corporate parent General Motors (Stevenson, 1992, p. D 1).

Military contractors are loathe to risk sizable new investments that would preserve their workforces and production facilities.

Contractor responses to the slowing growth of military spending in the late 1980s invite a discouraging forecast of how companies will respond to more dramatic cuts in the 1990s. Military contract reductions in 1990 alone resulted in nearly 154,000 lost jobs (National Commission for Economic Conversion and Disarmament, 1991, p. 1). Without financial assistance or requirements to plan for restructuring, and without new public goals on the scale of the cold war upon which to turn their sights, military contractors not unreasonably are loathe to risk sizable new investments that would preserve their workforces and production facilities.

Manning the Rear Echelon: Cold War Workers

Insofar as defense cuts are translated dollar-for-dollar into employee dismissals, the economy will produce less output. Relatively well-paid defense workers will spend extra time searching for jobs offering comparable compensation, and some workers will fail to find jobs that measure up to their technical skills. In the extreme, workers will simply take early retirement or otherwise leave the workforce. The chief victims, of course, will be the defense workers' families and communities. This was the experience with manufacturing decline in the "Rustbelt," and nothing encourages optimism in the coming period.

In the 1980s the numbers of workers in the economy dependent upon defense jobs jumped considerably. By the

peak of the Reagan build-up, at least 6.7 million Americans were employed in military-related jobs, and of these, 1.2 million had newly come under the defense umbrella in the 1980s, an increase of 22 percent. By 1985 in defense industries, there were almost three workers for every two who had been there in 1980 (Henry and Oliver, 1987, p. 8).

The "army" amassed during the 1980s included more private production workers and relatively fewer soldiers than was true in previous periods of military buildup. Of the 1.2 million new jobs, the Armed Services themselves received the smallest increase-l 19,000 between 1980 and 1987 (Department of Defense cited in Defense Budget Project 199 la, p. 11). Civilian defense jobs climbed by 79,000, an increase of only 6 percent. The private sector added 993,000 military-related jobs for an increase of 46 percent. These private sector workers are now vulnerable to cuts; Pentagon plans for disproportionate cuts in personnel will result in many facility-related layoffs.

Private sector workers are now vulnerable to cuts; Pentagon plans for disproportionate cuts in personnel will result in many facility-related layoffs.

DOD personnel levels could fall by 1.1 million by the year 2001 (U.S. Congress, Office of Technology Assessment, 1992, p. 19). Some analysts are convinced that the effects will be minimal, thanks to attrition and lower rates of recruitment (Magnusson and Payne, 1991, p. 35). But in today's military, career employees are a majority. Fifty-three percent of enlisted personnel have four or more years of service compared with 39 percent in 1974. Downsizing could entail a substantial number of involuntary separations (U.S. Congress, Congressional Budget Office, 1990, p. 15).

Separation benefits for service people are substantial, including generous severance pay for those serving more than six years, transitional health care, relocation assistance, advance notification, and, in many cases, educational benefits providing up to $25,000 in tuition assistance (U.S. Congress, Office of Technology Assessment, 1992, p. 25). But considering the Viet Nam era, long-term job prospects for mustered-out soldiers are not encouraging. Viet Nam-era veterans, unlike those in previous wars, have earned less than their nonveteran counterparts (Detray, 1982; Schwartz, 1986). Today'sveterans

may be more highly skilled than the average unemployed worker, but they face a more barren job market than in the 1970s, especially for younger members of the labor force.

Perhaps more devastating in the long run will be the lost opportunities for young Americans, particularly African-Americans and Latinos. It is estimated that the Pentagon will be recruiting 150,000 fewer young men and women of the 3 million Americans who turn 18 each year, or 5 percent of this age group (Magnusson and Payne, 1991, p. 36). For people without college educations, military service offers a competitive wage and benefit package. Researchers have found that military-provided training in the post-Viet Nam era helped recipients find civilian jobs and resulted in higher average wages, relative to comparable civilian training (Mangum and Ball, 1989). Particularly for minority men and women who face discrimination in the civilian job market, the opportunity for military training and a job with benefits will be sorely missed.

*On the defense **industry** side, jobs could shrink by as much as 1.4 million by **2001**. Because of the purchasing power **lost** by these workers a **negative multiplier effect** threatens another 2.5 million or more workers **with** job loss.*

On the defense industry side, jobs could shrink by as much as 1.4 million by 200 1 (U.S. Congress, Office of Technology Assessment, 1992, p. 19). Because of the purchasing power lost by these workers and the 1.1 million fewer service and DOD workers, a negative multiplier effect threatens another 2.5 million or more workers with job loss. Just as the older, civilian-oriented segment of American manufacturing was under siege in the 1970s and 1980s, with its own deadly ripple effects on surrounding communities, now the ACE manufacturers will face their own round of job loss. Meanwhile the deindustrialization of America's older manufacturing industries continues, hampering general employment prospects for displaced workers.

Because military industries have a relatively high proportion of scientists and engineers ("S&Es"), people in such occupations will encounter hardships not experienced in previous eras of deindustrialization. In the missile industry, for example, S&Es are 41 percent of the workforce-more than in any other American industry. The average for manufacturing as a whole is six percent. Computing, scientific instruments,

Table 7
Concentrations of Scientists and Engineers in Manufacturing, 1980

Rank	SIC	Title	Percentage of Total Employment (a) Engineering Engineering Technicians/ Computer Scientists	(b) Life & Physical Scientists	(c) Total Mathematics	a, b & c
		Total Manufacturing	5.51	0.26	0.05	5.82
1	376	Space Vehicles & Guided Missiles	40.90	0.21	0.08	41.19
2	357	Office Computing Machines	26.62	0.05	0.03	26.70
3	381	Engineering, Lab. Instruments, & Scientific Instruments	25.67	0.73	0.05	26.45
4	366	Communications Equipment	21.30	0.26	0.30	21.86
5	383	Optical Instruments & Lenses	18.73	1.03	0.04	19.80
6	286	Industrial Organic Chemicals	14.51	4.85	0.24	19.60
7	372	Aircraft & Parts	17.95	0.24	0.34	18.53
8	283	Drugs	8.86	8.59	0.22	17.67
9	291	Petroleum Refining	11.76	2.42	0.44	14.62
10	382	Measuring & Controlling Instruments	13.93	0.12	0.09	14.14
11	367	Electronic Components & Assembly	12.72	0.10	0.02	12.84
12	281	Industrial Inorganic Chemicals	9.46	3.14	0.05	12.65
13	282	Plastics & Synthetic Resins	9.38	1.81	0.17	11.36
14	351	Engines & Turbines	10.16	0.48	0.01	10.65
15	348	Ordnance	9.37	0.99	0.06	10.42

Source: Ann Markusen, Peter Hall, and Amy Glasmeier. High Tech *America* (Boston: Unwin & Hyman), 1986. Table 2.5. Based on the 1980 Occupational Employment Survey, United States Department of Labor.

and communications equipment also lead the list **(see Table 7)**, each with more than three times the average manufacturing incidence of. these occupations in the workforce (Markusen, Hall, and Glasmeier, 1986). Sixty-nine percent of aeronautical and astronautical engineers are dependent upon DOD and NASA funding for their livelihoods, as are 50 percent of oceanographers, 34 percent of physicists and astronomers, and 23 percent of electrical engineers and electronic engineers **(Table** 8). OTA estimates that from 1990 to 1995 approximately 127,000 defense engineering jobs could disappear (U.S. Congress, Office of Technology Assessment, 1992, p. 103).

Sixty-nine percent of aeronautical and astronautical engineers are dependent upon DOD and NASA funding for their livelihoods.

Defense-oriented scientists and engineers are paid more than their nondefense counterparts, helping cement the "wall of separation." The defense group reported an average professional income of $46,011 for 1985, compared with $38,946 for those not supported by defense spending. In other words, the nondefense scientist or engineer averaged 85 percent of the income of his or her counterpart in defense. This income gap had widened dramatically relative to the corresponding 198 1 rate of 92 percent (Markusen and Campbell, 1989).

Past defense build-downs and anecdotal evidence suggest that scientists and engineers displaced from defense-related jobs, especially older workers, have difficulty finding work. Prior to successful re-entry into civilian production, managers and engineers must unlearn the patterns of cost- and subsidy-maximizing that govern military production (Melman, 1983, p. 10). Relative to blue collar workers, however, this group on the whole has superior skills that facilitate re-employment, albeit sometimes at lower wage levels.

The average spell of unemployment following plant closings is considerably longer for blue- than for white-collar workers. Recent regional studies suggest that blue-collar workers will find re-employment more difficult because of generalized deindustrialization and a slack labor market (Howland, 1988).

As for white-collar workers, blue-collar military-related employment is concentrated in a few occupations. Aircraft

Table 8
BLS and SSE Estimates of Defense Dependency
by Occupation, 1986

Occupation	BLS	SSE
Aeronautical and Astronautical Engineers	36.6%	68.7%
Oceanographer	n/a	50.0
Physicists, Astronomers	7.4	33.9
Electrical and Electronics Engineers	14.6	31.6
Metallurgical and materials Engineers	16.5	24.2
Mathematicians	4.8	20.3
Physical Scientists	2.8	19.9
Mechanical Engineers	12.0	17.6
Other Engineers	14.7	17.2
Nuclear Engineers	10.0	15.8
Industrial Engineers	14.4	13.4
Computer Scientists	5.2	13.2
Atmospheric Scientists, Meteorologists	7.4	9.7
Statisticians	6.2	8.9
Civil Engineers	3.8	8.2
Chemists	4.1	7.1
Earth Scientists, Oceanographers	3.3	5.0
Chemical Engineers	7.0	5.0
Other Social Scientists	1.1	4.7
Medical Scientists	n/a	4.3
Economists	3.5	4.3
Biologists	1.5	3.8
Sociologists, Anthropologists	n/a	3.8
Biochemists	n/a	3.4
Psychologists	0.4	3.1
Mining Engineers	4.3	2.7
Petroleum Engineers	3.4	0.9
Agricultural Scientists	1.5	0.8
Urban and Regional Planners	0.8	n/a

Source: Compiled by Ann Markusen from unpublished data from the National Science Foundation's Survey of Scientists and Engineers, and the Bureau of Labor Statistics. The SSE data differs from the BLS statistics because it includes work performed for NASA, the Department of Energy, and other non-DOD military projects,

*Defense-oriented scientists and engineers **are** paid more **than** their nondefense **counterparts,** helping **cement** the **"wall of separation."***

assemblers and other skilled metal and electronics workers have high rates of defense dependency, even in conservatively estimated DOL data **(Tables** 8 **and** 9). At least 53 percent of ship-fitters, for instance, are defense-dependent, while riggers, machinists, tool-and-die makers, and machine tool operators are three times as apt to be working on military projects as the average American worker.

Table 9
Selected Military-Related Occupations, 1986

Occupation	Military-Related (1000s)	Total Employment (1000s)	Military Share (Percent)
White Collar			
Aeronautical, Astronautical Engineers	18.9	51.6	36.6%
Metallurgical, Materials Engineers	2.9	17.8	16.5
Electrical, Electronic Engineers	57.0	391.5	14.6
Mechanical, Industrial Engineers	44.2	345.1	12.8
Nuclear Engineers	1.4	13.8	10.0
Purchasing Agents	14.5	184.9	7.8
Chemical Engineers	3.6	51.4	7.1
Mathematicians, Statisticians	2.1	38.2	5.4
Computer Scientists, Systems Analysts	18.7	349.7	5.4
Physicists, Astronomers, Physical Scientists	2.2	41.7	5.2
Civil Engineers	7.4	193.1	3.8
Economists	1.0	28.9	3.5
Agricultural, Biological, Forestry Scientists	1.4	107.5	0.1
Urban and Regional Planners	0.2	20.5	0.8
Psychologists	0.3	66.2	0.4
Pink and Grev Collar			
Tool Programmers, Numerical Control	1.6	8.8	18.1
Procurement, Planning, Expediting Clerks	27.2	251.5	10.8
Engineering Technicians	65.1	682.9	9.5
Drafters	25.3	333.2	7.6
Guards	53.9	784.8	6.9
Pest Controllers and Assistants	2.5	43.8	5.8
Computer Programmers	25.7	463.6	5.6
Registered Nurses	4.6	1387.6	0.3
Cashiers	13.9	2122.5	0.7
Blue Collar			
Aircraft Assemblers	12.2	24.0	50.9
Electrical and Electronic Assemblers	30.0	170.1	17.7
Machinists, Metalworkers, Ship-fitters	94.8	900.0	10.5
Aircraft Mechanics, Engine Specialists	10.8	105.1	10.3
Machine Tool Operators	99.8	966.1	10.3
Welders, cutters, solderers, brazers	29.1	283.5	10.3
Inspectors, Testers, and Graders	65.7	689.9	9.5
Metal/Plastic Machine Operators	45.2	586.1	7.9
Data Processing, Electronic Repairers	8.2	109.1	7.5
Millwrights	5.8	86.2	6.7
Plumbers, Pipe-fitters, Steam-fitters	17.2	343.2	5.0
Sewing Machine Operators	10.9	781.6	1.4
Auto Mechanics	6.8	578.2	1.2

Source: Compiled by Ann Markusen from unpublished Department of Labor data, 1986.

Some pink- and gray-collar occupations[15] are favored by military outlays. Procurement, production, planning and expediting clerks are employed at rates two to three times the national average; pest controllers and technical writers have rates in excess of the national average. Cost estimators, employment interviewers, and blue-collar supervisors are also relative beneficiaries.

Blue-collar defense workers have long been subject to feast-or-famine cycles in defense, work. Sometimes layoffs persist for two years before a new weapons system comes on line. This time, many more layoffs will be permanent. In the 1990s, fewer jobs than ever will be available to machinists, welders, and metalworkers in civilian industries racked by more than a decade of deindustrialization. While most scientists and engineers will find other work, albeit at lower pay or skill levels, many blue-collar workers will succumb to involuntary retirement. If plant-closing experience in the 1980s is any guide, workers will also suffer extended periods of unemployment.

Analysts cite the Northeast, particularly Connecticut and Massachusetts, as the region most likely to suffer severely from cutbacks, due to a high rate of defense-related employment and a comparatively slow rate of employment growth .

Cold War Regions and Defense-Dependent Communities

Military cutbacks have begun to erode the relative prosperity of a region that we have elsewhere called the "gunbelt" — a half-moon shaped perimeter, thickest in Southern California, stretching northward through Silicon Valley and Seattle and eastward through the inter-mountain and Plains states, Texas, Florida, Long Island and New England, and conspicuously detouring the traditional industrial heartland (Markusen, Hall, Dietrick, and Campbell, 1991). Analysts cite the Northeast, particularly Connecticut and Massachusetts, as the region most likely to suffer severely from cutbacks, due to a high rate of defense-related employment and a comparatively slow rate of employment growth (Whitehead, 1991, p. 34). Other states vulnerable to defense cutbacks include Virginia, the District of Columbia, Mississippi, Massachusetts, Missouri, Alaska, Maine, Alabama, and Arizona. The composition of planned cutbacks for 1991 will be particularly hard on the states of Missouri,

Table 10
Per Capita Prime Contracts Relative to U.S. Average, Selected States and Years

Region/State	1951	1958	1967	1977	1984
New England					
Connecticut	440	300	350	310	330
Massachusetts	100	120	130	200	230
New Hampshire	70	50	120	90	130
Eastern Seaboard					
New York	190	120	100	120	100
New Jersey	160	120	90	80	80
Maryland	130	130	120	130	180
Virginia	30	50	80	190	160
Southeast					
Georgia	30	70	140	50	10
Mississippi	10	20	30	10	160
Florida	10	60	70	60	70
Plains					
Kansas	80	450	100	80	180
Missouri	60	100	260	230	250
Southwest					
Texas	40	130	180	100	100
Arizona	30	130	80	110	110
Utah	20	80	90	80	100
Nevada					
Pacific					
California	180	250	180	220	210
Washington	140	360	100	220	130
Alaska			160	150	170
Hawaii			50	120	100
Midwest					
Indiana	240	80	90	70	90
Michigan	200	60	60	70	50
Ohio	140	90	80	50	50
Wisconsin	100	30	50	40	40
Illinois	90	50	50	20	20

Source: Compiled by Ann Markusen from U.S. Department of Defense, Prime Contract Awards By State, various years. Washington, DC: Government Printing Office.

Table 11
RDT&E Prime Contract Awards to Business Firms, Top Ten States: 1962- 1982

Year	1962			1972			1982	
State	$000	Percent	State	$000	Percent	State	$000	Percent
Total U.S.	5,627,656	100.0%	Total U.S.	5,119,055	100.0%	Total U.S.	13,222,981	100.0%
California	2,310,710	41.4	California	1,562,918	30.5	California	5,389,392	40.8
New York	629,543	11.2	New York	517,546	10.1	Washington	973,168	7.4
Washington	489,720	8.7	Florida	462,988	9.0	Florida	766,392	5.8
New Jersey	289,194	5.1	Massachusetts	372,876	7.3	Massachusetts	759,262	5.7
Massachusetts	244,182	4.3	Missouri	360,356	7.0	Missouri	575,806	4.4
Florida	229,035	4.1	New Jersey	295,292	5.8	New York	565,635	4.3
Colorado	223,198	4.0	Washington	270,301	5.3	Colorado	537,021	4.1
Pennsylvania	218,985	3.9	Texas	163,184	3.2	Maryland	47 1,532	3.6
Maryland	133,274	2.4	Ohio	152,870	3.0	Texas	445,625	3.4
Ohio	121,596	2.2	Pennsylvania	147,083	2.9	New Jersey	390,528	3.0
Cumulative Distribution: Top Ten States		87.3			84.1			82.5

States Ranked by Per Capita Expenditures Relative to U.S. Average (States greater than 100 only.)

Washington	549	Washington	322	Washington	399
California	447	California	311	California	383
Utah	406	Missouri	309	Colorado	307
Colorado	388	Massachusetts	262	Massachusetts	232
Massachusetts	153	Florida	256	Utah	210
New Jersey	150	New Jersey	163	Missouri	204
Florida	138	Arizona	157	Maryland	194
New York	120	Maryland	136	Florida	128
West Virginia	112	Connecticut	117	Virginia	110
		New York	115	Kansas	109
		Vermont	109		

Source: Compiled by Ann Markusen from U.S. Department of Defense, Prime Contract Awards By State, various years. Washington, DC: Government Printing Office.

Table 12
RDT&E Prime Contract Awards to Educational Institutions, Top Ten States, 1962-1982

Year	1962			1972			1982	
State	$000	Percent	State	$000	Percent	State	$000	Percent
Total U.S.	345,873	5.7%	Total U.S.	368,651	6.4%	Total U.S.	851,536	5.8%
Massachusetts	117,111	33.8	Massachusetts	134,610	36.5	Maryland	273,378	32.1
Maryland	50,123	14.5	Maryland	73,336	19.9	Massachusetts	234,084	27.5
California	42,706	12.3	California	30,807	8.4	California	70,011	8.2
Illinois	27,085	7.3	Pennsylvania	14,959	4.1	Pennsylvania	31,877	3.7
New York	24,741	7.1	New York	14,155	3.8	Illinois	24,487	2.9
Pennsylvania	10,976	3.2	Virginia	10,251	2.8	New York	21,344	2.5
Michigan	10,877	3.1	Michigan	7,978	2.2	Ohio	20,504	2.4
Ohio	7,137	2.1	Ohio	7,291	2.0	Texas	20,046	2.4
D.C.	6,606	1.9	Illinois	7,199	2.0	New Mexico	19,852	2.3
Texas	5,233	1.5	Texas	7,102	1.9	Florida	13,407	1.6
Cumulative Distribution: Top Ten States		85.6			83.6			85.6

States Ranked by Per Capita Expenditures, Relative to U.S. Average (States greater than 100 only.)

Massachusetts	1,196	Massachusetts	1,312	Maryland	1,742
Maryland	826	Maryland	1,023	Massachusetts	1,109
D.C.	451	Alaska	541	New Mexico	395
Alaska	341	New Mexico	289	D.C.	304
New Mexico	210	D.C.	285	Utah	210
Rhode Island	161	Utah	199	Rhode Island	113
Illinois	141	Virginia	122		
California	134	Washington	111		
		Rhode Island	105		
		Hawaii	103		

Source: Compiled by Ann Markusen from U.S. Department of Defense, Prime Contract Awards By State, various years. Washington, DC: Government Printing Office.

Texas and Arizona (Lall and Marlin, 1992, pp. 52-3) **(Tables 10, 11, and 12).** Within these states, the impacts of defense cutbacks will be concentrated, often in the very industrial districts that previously led their states' economies. Many of the most successful regions in the post-war period, especially those celebrated in the "new industrial districts" literature (Piore and Sabel, 1984; Scott, 1988; Saxenian, 1989), are those that have been major recipients of defense procurement expenditures. Top-ranking counties at the height of the buildup included Los Angeles, Santa Clara (Silicon Valley), Orange (CA), Middlesex (MA), King (WA-Boeing), and San Diego **(Table 13).** Spending cuts will be toughest to digest for those communities where absolute levels of spending are high and the local economy is relatively dependent upon defense spending. In the past, the Los Angeles and Seattle economies have demonstrated considerable sensitivity to military spending cycles, each enduring periods of considerably higher-than-average unemployment when defense spending was down.

Of the 485 major military bases in the United States today, *most date from World War II, when there were six times the number of personnel.*

Cuts at Seattle's Boeing Corporation from 1968 to 197 1 illustrate the perils facing military-dependent areas. In 1968 Boeing accounted for 19 percent of the Seattle metropolitan area workforce. Due to commercial and military setbacks over the next three years, Boeing employment dropped from 1 00,000 to 38,000. Area unemployment shot up to 12 percent, double the national average, for a sustained period (Markusen, Hall, Deitrick, and Campbell 199 1, Chapter 8).

Many smaller communities are even more vulnerable. For example, the Bath Iron Works, located on the relatively isolated coast of Maine, will experience sharp reductions as the Navy reduces the size of its fleet. Laying off the yard's 11,000 civilian workers could generate high levels of regional and statewide unemployment. Job prospects for ship-workers are bleak, as neither commercial shipbuilding nor traditional manufacturing industries in the region appear likely to generate new employment (U.S. Congress, Congressional Budget Office, 1992, pp. 38-39).

Table 13
Department of Defense Prime Contracts, 1984

Rank	County	Total Contracts
1	Los Angeles, California	13,763
2	St. Louis, Missouri	5,852
3	Santa Clara, California	4,661
4	Orange, California	3,716
5.	Nassau, New York	3,662
6	Middlesex, Massachusetts	3,642
7	Tarrant, Texas	2,942
8	King, Washington	2,422
9	San Diego, California	2,156
10	Cobb, Georgia	2,122
11	Sedgwick, Kansas	2,077
12	Essex, Massachusetts	1,946
13	Hartford, Connecticut	1,846
14	Jackson, Mississippi	1,762
15	New York, New York	1,664
16	New London, Connecticut	1,571
17	Fairfield, Connecticut	1,548
18	Suffolk, New York	1,400
19	Dallas, Texas	1,398
20	Baltimore City, Maryland	1,373

Source: Compiled by Ann Markusen from Bureau of the Census, 1984.

*The **impact** of base closures **will** vary depending on local cifcumsfances, including economic **resources,** proximify fo urban areas, and planning.*

Communities hosting military bases are also vulnerable. Of the 485 major military bases in the United States today, most date from World War II, when there were six times the number of personnel. In 1988 the Commission on Base Realignment and Closure recommended closing 86 U.S. bases, partial closure of five others, and realignment of 54 more. [16] In 199 1, the Secretary of Defense recommended closing 34 additional bases and realigning 48 others. Additional recommendations will be made in 1993 and 1995 when the Base Closure Commission reconvenes.

Thus far only Pease Air Force Base and the Philadelphia Naval Hospital have closed, but it is likely that most or all bases on the closure lists will indeed be shut down as scheduled in the next five years. The impact of base closures will vary depending on local circumstances, including economic resources, proximity to urban areas, and planning. For some rural communities

the impact will be tantamount to shutting down the local economy; for others, base property promises economic development windfalls.

The Pentagon's Office of Economic Adjustment (OEA) reports that 100 military bases were successfully converted over the past three decades, and net change in civilian jobs at these facilities has been positive (U.S. Department of Defense, Office of Economic Adjustment, 1991). Although there are limitations to the OEA study's methodology, the results are encouraging and suggest that concerted government action to shepherd conversion can work. [17] In the 1990s, however, reduced levels of federal economic development funding and increased environmental problems may make redevelopment of military bases a more difficult task than in earlier decades.

The goal of conversion policy is to minimize employment losses in local areas and, where possible, in individual p/ants.

Conversion: A History of Prevarication

Economic conversion is defined as the reorganization of military-related facilities and human resources for production of nonmilitary goods and services. The goal of conversion policy is to minimize employment losses in local areas and, where possible, in individual plants. The chief benefit of conversion policy is to minimize the costs of relocating human and physical capital. In the context of an effective industrial policy, conversion can foster infant industries and new technologies, enhance the U.S. comparative advantage in civilian sectors, and reduce trade deficits. A third possible benefit goes to the local public sector through the transfer of useful, deactivated military facilities.

In recent years, however, conversion has had some credibility problems. After the Viet Nam War, efforts by companies to enter civilian markets (such as Grumman's efforts to build buses, and Boeing-Vertol, Ingalls, Allied-Signal and Rohr's entry into the mass transit market) met with numerous problems. This prompted many to conclude that military companies were too specialized and/or spoiled by the

Pentagon's lack of concern with cost to compete in commercial markets. [18]

Here is a subject for which reliance on anecdotes and the absence of good social science research leads to false conclusions. Pessimistic assessments of defense contractors' ability to convert are based on the record of losers, not winners. Those that failed to shift complain loudly about their plight, while those that successfully converted are no longer among the ranks of defense contractors. [19]

Many companies converted their facilities and redirected their labor forces into civilian work with little fanfare. Others reused former military facilities. AT&T's Bell Labs left military contracting business years ago without incident. Harley-Davidson now makes precision equipment at the old York Naval Ordnance Plant in York, Pennsylvania (National Commission for Economic Conversion and Disarmament, 199 1, p. 5).

DOD has not encouraged contractors to remain viable through downturns by serving civilian markets.

Jones (1992) cites a number of successful conversions, such as the transformation of Acurex Corporation from a firm which in 1964 had worked in the development of the combustion process in rockets to civilian solar technologies by 1981; the conversion of Cletronics, a small company which had produced magnetic parts for military contracts, to the production of a magnetic-detection device for pacemakers; and the Kalico Company's transition from a firm which had received 85 percent of its sales from the sales of sensors used to measure pressure and position for missiles to producing advanced automotive parts.

Obstructing the conversion process is the fact that since the 1950s the business planning that must accompany successful conversion was left to the sole discretion of management. Not since World War II, when the War Production Board required military contractors to anticipate the war's end, have any regulations or incentives been in place to induce business cooperation. The Department of Defense views its mission as preserving the defense industrial base, but DOD has not encouraged contractors to remain viable through downturns by serving civilian markets. Although awards to defense contrac-

tors include generous overheads for research that might prove to be of military value, no portion of the contract is set aside for planning for or facilitating conversion to nondefense activity. Furthermore, military contractors are often exempt from plant closing laws that require advance notification. This results in the senseless dumping of workers on the job market. When General Dynamics recently shut down its Fort Worth F-16 fighter plant, for instance, more than 3,000 workers were displaced without a day's notice (Melman, 1992, p. 11).

Most states encourage economic adjustment programs for workers and communities father than conversion.

Federal government inaction has left the responsibility for coping with military base and plant closings to state and localgovernments. In the 1980s, diverse efforts by union locals, peace activists, and state and local governments tackled conversion of specific facilities (Hill, Deitrick, and Markusen, 199 1). Several states, including Connecticut and Washington, passed legislation encouraging conversion (Hill, 1990). California, Maine, Massachusetts, New York, Ohio, Rhode Island, Texas, Virginia, and Washington have created new institutions and programs to address defense cutbacks. Most states encourage economic adjustment programs for workers and communities rather than conversion (Lall and Marlin, 1992, p. 63). Opposition from military contractors at all levels of government has constrained these efforts.

As defense outlays began to decline in 1989, the Congress debated new conversion legislation seriously for the first time in decades. Again, due to staunch Pentagon and contractor resistance, the more far-reaching proposals for alternative-use planning and conversion assistance were scrapped. Instead of forestalling plant closings and worker displacement through conversion, $200 million was appropriated to "clean up the mess"—$150 million to help unemployed workers retrain and find new work and $50 million to help communities explore economic development prospects. A reluctant DOD was supposed to pass funds to the Economic Development Administration and the Department of Labor. The history of these funds shows clearly why conversion leadership should not be left to the Department of Defense. Almost two years later,

only half of the $200 million has left DOD, and that only recently. DOD has no incentive to shepherd funds to needy places quickly, because whatever is not released ends up in its Operations and Maintenance budget where it may be diverted to other uses.

As of March of 1992, only $50 million in retraining funds had been released by DOD and only $6 million had actually been awarded to state programs; it is likely that funds have yet to reach any real workers. Among other design flaws in the program, workers may only receive adjustment assistance after they are laid off. A preventive strategy would provide services before layoffs and thus preclude some unemployment (U.S. Congress, Office of Technology Assessment, 1992, Chapter 3).

Community economic adjustment funds were finally transferred to EDA in February. To date they have been awarded for planning activities to a number of defense-dependent communities, including Lynn, Massachusetts, where a GE engine plant has closed; St. Louis, where McDonnell Douglas has laid off thousands of workers; and southern Mississippi, where the Picayune Army Ammunition Plant has been deactivated (National Commission for Economic Conversion and Disarmament, 1992, p. 5). The OEA has given planning assistance primarily to communities faced with military base closings; recently it began to give planning grants to state and local governments. St. Louis, Massachusetts, and Los Angeles efforts have benefited.

The *OEA has* given *planning assistance primarily to communities faced with military base closings; recently if began to give planning grants to state and local governments.*

Even where planning is conducted, jobs in the community for former defense workers or soldiers are not guaranteed. The recently completed St. Louis plan recommends an international trade center, a biotechnology incubator, and a revolving loan fund for existing small businesses (Saint Louis Economic Adjustment and Diversification Task Force, 1992). None of these offers much prospect for aircraft engineers and blue-collar workers. Such proposals do not really tackle the conversion problem because they offer no tools or incentives to defense industry companies and workers to prepare to convert.

Larger sums for readjustment are being considered for 1993. The House Budget Resolution of early 1992 commits $3 billion for conversion, a third of which would be charged to a defense budget totaling $283 billion. But the nondefense portion, on closer inspection, merely serves up a smorgasbord of goodies for pre-existing programs. For example, $300 million would go to NASA to offset other budget cuts. It is likely that the defense portion of the program would be handed over to DOD for the purchase of "dual use" technology.[20] It would be highly misleading to describe such efforts as conversion.

Conversion planning has not always faced the hostility it confronts today. After World War II military-oriented businesses converted fo civilian production with little hardship.

Despite Congress' acknowledgment of the seriousness of the issue, four major conversion bills are gathering dust in committee. All bills provide for a Cabinet-level office of coordination. Two provide for alternative use committees, and at least one stipulates that planning for civilian reuse should be an ongoing part of defense production.[21] All the bills are currently dead letters; Congress is using this year's Defense authorization bill to address conversion in lieu of direct legislation.

Conversion planning has not always faced the hostility it confronts today. After World War II military-oriented businesses converted to civilian production with little hardship. Some nine million soldiers returned to the civilian labor force, about 14 percent of the total. "In one year, 1945- 1946," notes Kenneth Boulding, "we transferred 30 percent of the GNP from the war industry into civilian uses, without unemployment ever rising above 3 percent, an astonishing testimony to the flexibility of the American economy and also to some wise planning by the Committee for Economic Development at the local level" (cited in Dumas and The, 1989, p. 7). Planning played an essential part from as early as 1943 (Ballard, 1983) .[22]

Although conversion was emphasized less after the Korean War, some aircraft and electronic firms successfully diversified into civilian areas such as commercial and corporate aircraft, industrial electronics, small gas turbines, nuclear reactors, and heavy-duty construction vehicles (Lynch, 1987, p. 16). Furthermore, they benefited from the R&D and guaranteed markets opened up by the cold war. As the wall of separation began to rise, Pentagon officials worried that com-

mercial diversification might hamper firms' abilities to fulfill military orders. A new solicitousness toward the defense industrial base developed concurrently with growing indifference, if not hostility, to convertibility (Gilmore and Coddington, 1966, p. 146). The hostility persists to this day, despite the fact that the adjustment problem is greater now than at any time since 1945.

Approaches to Conversion

The number of recent successful conversion efforts entailing the reuse of existing personnel, plant and equipment on site remains low primarily because so few companies have made efforts in these directions. Four relevant types of adjustment are: company diversification, community economic redevelopment, worker readjustment, and facility conversion. Each has distinct goals, a different lead agent, and a unique track record.

Since the Viet Nam war, documented cases of successful market shifts and internal diversification by defense companies are few in number.

Company diversification: Companies have responded to the specter of defense spending cuts by pursuing one or more of several routes: closing plants and offices; selling off defense divisions; exporting arms abroad; seeking other government or commercial markets for existing products; internal diversification through development of new product lines; and external diversification through the acquisition and buy-outs of existing firms in unrelated fields. Only two — seeking new markets for existing products and internal diversification through development of new product lines — come close to the conversion ideal; they offer the greatest prospects for keeping intact existing workplaces.

Since the Viet Nam war, documented cases of successful market shifts and internal diversification by defense companies are few in number, though given the dearth of good evaluative research many more may have occurred. Company success stories include Kaman's shift into the guitar and bearing markets and Raytheon's development of microwave cooking technology (DeGrasse, 1987). More recently, Frisby on Long Island, and Cavlico in California have all successfully redi-

rected their defense-bred technologies to civilian markets. In recent years, more companies, particularly small ones, are making the transition (Jones, 1992, p. 50).

Company efforts to diversify through mergers and acquisitions may be good for stockholders, but they do not offer alternative employment at facilities closed by contract cancellation. Flush with cash from the huge defense build-up of the first half of the 1980s and cognizant of inevitable future defense cuts, companies used their defense profits to buy firms in unrelated fields. The result was a marked decrease in defense dependency at the firm level while real defense sales increased dramatically for all the big contractors. By the end of the decade the big defense firms appeared to be more diversified, but the number of workers threatened by defense cuts was larger than it had been for decades. No policy was in place anywhere to encourage firms to plan for conversion.

State and local governments have responded to intensified deindustrialization and simultaneous cuts in federal funding with some remarkable innovations.

Community economic redevelopment. Communities are now struggling with the consequences of base closings and defense plant shutdowns. Usually they rely on local economic development offices; sometimes there is help from state government agencies. Their strategies are quite similar to those pursued by any locality that faces deindustrialization or decline of its economic base. They take inventory of local resources, identify potential activities and employers, and offer technical assistance and subsidies of various sorts to existing or new enterprises.

Established in 1961, the Pentagon's OEA assesses the local predicament, offers planning assistance, and helps to package programs from the Department of Commerce's Economic Development Administration and the Department of Labor to ease the adjustment process. OEA has given assistance in over 100 cases of military base closings during the past three decades: it has documented the creation of 158,104 new jobs, more than making up for the loss of 93,424 civilian jobs (U.S. Department of Defense, Office of Economic Adjustment, 1991, p. 1).

office and service jobs in insurance and tourism did little for skilled blue-collar machinists and aircraft mechanics (Lynch, 1987). Given this background, there have been concerted efforts to address the unemployment of workers and soldiers by creating programs for job placement, income support, and retraining. Few programs have been targeted directly on military-dependent civilian workers, and these have been directed toward professional rather than blue-collar employees. In the early 1970s a Technology Mobilization and Re-employment Program (TMRP) provided defense scientists and engineers with career counseling, job search grants, on-the-job training, and relocation assistance. An innovative component of this effort was aimed at placing former aerospace engineers with local governments; it was relatively unsuccessful in spite of insufficient funding, confusion over the potential for skill transfer, and workers' reluctance to relocate. At a cost of $28 million, TMRP helped 34,000 engineers and scientists find new work. Although this is a fairly good performance, TMRP helped only a small percentage of those displaced (Kulik and Fairchild, 1987).

*Policies directed at displaced military-industrial workers could be blended **with** strategies for displaced workers from **all sectors.***

New proposals for efforts directed explicitly at military industrial workers have been floated recently. Some build on analogies with existing programs, including the federal government's Trade Adjustment and Assistance (TAA) program, which targets workers displaced by import competition, or the Title III program of the Job Training Partnership Act (Kulik and Fairchild, 1987). These programs have been criticized, however, for their short-term focus, delays, and minimal coverage (Wykle, Morehouse, and Dembo, 1991). Some trade unionists argue that displaced blue- collar workers need a major re-education to find work in the new computerized plant or office. A more ambitious proposal for a "worker super-fund" has been advanced by Tony Mazzochi, an official with the Oil Chemical and Atomic Workers' Union. Like the GI bill following World War II, the super-fund would provide income support to permit former workers to return to school long enough to learn new skills.

Local economic development efforts have strengths and weaknesses. On the one hand, tools at the disposal of state and local government are quite limited. Because state and local governments' tax bases are unproductive during periods of economic distress, they must rely on exhortation, jawboning, tax abatement, and infrastructure provision. Nevertheless, state and local governments have responded to intensified deindustrialization and simultaneous cuts in federal funding with some remarkable innovations in the past decade. Examples include business incubators, special assistance to small businesses, technology transfer among firms and between educational institutions and firms, new efforts in retraining and worker literacy, and export promotion programs (Osborne, 1987; Markusen and Carlson, 1989).

What is most promising about community economic redevelopment efforts in the 1980s is their pioneering of a new planning infrastructure.

What is most promising about community economic redevelopment efforts in the 1980s is their pioneering of a new planning infrastructure. Many state and local governments have substantially expanded and professionalized their economic development activities, building local data bases and information systems and developing expertise in the leveraging of resources for job creation. Following in the tradition of local government activities after World War II, these organizations could serve as forums for more effective efforts at economic conversion, including alternative-use planning and the marshalling and coordination of public services to smooth the transition. Their existence obviates the need for a federal government bureaucracy to dominate conversion activities.

Worker retraining, re-education and placement: Even when company diversification and community economic redevelopment are successful, not all former workers find themselves satisfactorily employed. Diversified companies often hire new types of workers in new locations. Boeing-Vex-to1 in Philadelphia employed 13,000 at the height of the Viet Nam war, but its mass transit project provided work for only 550 (Maki, Bolan, and Akhavi-Pour, 1991, p. 16). Frisby's new civilian plant is located in the Southeast, far from its Long Island workforce (McNeilly, 1990, p. 1). The effort to supplant lost aircraft jobs at Boeing's Wichita facilities with downtown

Policies directed at displaced military-industrial workers could be blended with strategies for displaced workers from all sectors. Since many workers in auto, steel, machinery, and textiles have lost their jobs through relative government neglect while taxpayers' resources were lavished on the ACE industries, a broader and more comprehensive readjustment program for all workers is appropriate. In the final analysis, all displaced workers face the same major problem: finding new skills to be matched to the new occupations evolving in the economy. Of course, the nation has a special responsibility to military-related workers because the government has directly or indirectly employed them. In the short terrn, innovative experiments with military-related worker adjustment could be a model for future universal programs.

In general, facility conversion efforts require more technical assistance, especially from oufside ***experts, than they*** *have received in* ***the past.***

Facility-based conversion *efforts:* Because of the geographical isolation of defense workers, and because their displacement in recent years has been occurring in a relatively depressed economy, much interest has been focused on transferring existing plants and production processes from military to civilian activities as a way of staving off prolonged unemployment. This task is more challenging than the average plant closing because of the distortions in business structure and culture bred through years of dealing with the Pentagon and ignorance about the operation of civilian markets. An explicit planning approach must be introduced, much like the OEA's attempts to recycle closed military bases. One such approach involves alternative-use committees consisting of representatives from management, the workforce, and the community who would cooperate in evaluating and carrying out conversion plans (Melman, 1988).

In the 1980s, a number of highly visible and sometimes contentious efforts to plan for conversion sprouted in military industrial districts around the country-at Quincy Shipyards, near Boston; at the Blaw-Knox Foundry near Chicago: at the Philadelphia Naval Shipyards; at the McDonnell-Douglas aircraft plant in Long Beach, California; at Puget Sound shipyards near Seattle: and at the Unisys Corporation defense computer

facility in St. Paul, Minnesota. In each case, a coalition of workers, trade unionists, community activists and economic developers, and, in some cases, middle-level plant managers searched for alternative product lines and convinced top level managers to commit resources to the planning and reconversion process (Hill, Deitrick, and Markusen, 199 1).

Although none of these efforts was as successful as its proponents might have wished, each has contributed to an understanding of the political and technical problems in conversion. In general, facility conversion efforts require more technical assistance, especially from outside experts, than they have received in the past. Marketing and financing assistance are in particularly short supply. In addition, earlier warning of plant closings and public disclosure of financial conditions would assist conversion. Facility conversion efforts, especially when initiated by workers or community groups, face a skeptical, and sometimes adamantly contrary management (Hill, Deitrick, and Markusen, 1991). Some carrots and sticks, as suggested below, need to be included in a comprehensive conversion policy to ensure managerial participation.

The recent history of industrial decline demonstrates irrefutably that markets do not work satisfactorily in reallocating resources.

Lessons from a Decade of Plant Closings

The 1980s were a decade of stunning losses in many civilian industries, but then also provided a casebook of experiences from which to craft conversion strategies. First, the recent history of industrial decline demonstrates irrefutably that markets do not work satisfactorily in reallocating resources, including manpower, from closed plants. Millions of workers who lost their jobs suffered prolonged periods of unemployment, involuntary retirement, and permanent income loss (Hamermesh, 1989; Bluestone and Harrison, 1982). Cities and communities from Boston to Los Angeles, from rural Kentucky to western Montana, found that intensive, novel, and targeted efforts were needed to marshal these resources into new productive channels.

Because these closings occurred in an era of federal government indifference and great diminution of federal aid,

state and local governments had to set up new agencies and institutions to address the problem of deindustrialization. Old economic development formulas such as smokestack-chasing simply did not work (Buss and Vaughan, 1987). Nor did strategies which shook their fingers at workers and the public sector, counseling wage and tax cuts.

New approaches focused on retaining existing businesses, most of them small and medium-sized, through provision of technical assistance in building markets and retraining workers. The Michigan Modernization Service was aimed particularly at second-tier auto suppliers, and a Steel and Auto Division was added to the Michigan State Department of Commerce. Ohio established a Steel Futures Fund, and Chicago underwrote a high-profile task force on steel. In the Pittsburgh area, the Steel Valley Authority was created to help retain and transform aged metals capacity, using the power of eminent domain and an annual budget to act as the agency of first resort for management, workers or communities facing a plant shutdown (Markusen, 1988). By the 1990s these innovations and the agencies set up to manage them had solid achievements to their credit and were heavily scrutinized by aspiring communities elsewhere, even abroad, as models for a new era of economic development planning.

Worker ownership has been quite successful in preventing hundreds of shutdowns and saving thousands of jobs.

None of these strategies guaranteed that particular workers in particular plants would maintain their livelihoods. The most promising innovation in that vein was the dramatic growth in worker ownership pioneered by labor unions, local economic developers, and a new breed of public interest business consultants. By 1990, the National Center for Employee Ownership catalogued 9,870 firms owned, at least in part, by their workers. Some worker buy-outs were spectacular failures (Redmon, Mueller, and Daniels, 1985), while others have been criticized as undemocratic and corrosive of workers' incomes and working conditions (Lynd, 1985). But worker ownership has been quite successful in preventing hundreds of shutdowns and saving thousands of jobs, in large part because of superior new management, fresh infusions of capital, and

willingness on the part of new owners to accept, at least for the time being, less than market rates of return.

Worker buy-outs in the past have been impeded by the secrecy behind which companies typically make shutdown decisions. Often workers would receive notice on Friday that the plant would be closed as of Monday. As a result, pressure for prior notification culminated in substantial new legislation in the 1980s at both state and federal levels (Howland, 1988). Furthermore, some public or community-based organizations have set up "early warning" networks to help workers gain skills in evaluating the profitability of their workplaces and anticipating closings. These arrangements have built competence within and around industrial plants across the nation.

Many economists would recommend that defense contractors and their workforces sink or swim in the changing market.

The rash of plants closings in the 1980s left a legacy of new ideas, institutions, and programs that are grounded in localities and tailored to the differences inherent in each region. They have prompted the creation of an economic development planning infrastructure that is either in place or can be relatively easily replicated in the hundreds of communities facing defense plant closing or military base shutdowns. Their existence is a considerable asset to the nation because they could operate as a decentralized network for delivering conversion services.

Converting the Cold War Economy

Nearly 50 years of cold war have placed the American economy in a unique predicament. While accounting for hundreds of billions of dollars in sales by private companies over a sustained period, the military budget molded business cultures according to the peculiar military market. Military spending entailed a highly successful industrial policy, constructing American comparative advantages internationally in favored industries.

Many neoclassical economists would recommend that defense contractors and their workforces sink or swim in the

changing market. Why should companies consistently nurtured on a steady diet of public contracts continue to be shored up at taxpayer expense after the need for their products and services has vanished? Because these firms have so often been caught overcharging the government, engaging in bribery, and lobbying for an aggressive U.S. military posture, the argument may be all the more appealing.

But matters are not that simple. The investment of trillions in the cold war buildup has created an array of ACE industries (aerospace, communications, electronics) which now embody much of the leading edge technological capability of the United States. These industries have posted the highest rates of manufacturing output growth in the last two decades, and they account for the lion's share of net manufacturing trade receipts. They employ disproportionately large shares of the nation's scientists and engineers. Even sectors such as computing and semiconductors, which have successfully developed extensive commercial markets, still rely heavily on military contracts for basic research and innovation funding. Without ACE, the nation's prowess in leading- edge industries is endangered.

The wall of separation and the unusual business culture fhaf has grown up behind if block a switch to commercial markets.

To simply contract dramatically, a possibility opened up by the end of the cold war and made more tempting by the recession and the budget deficit, would sacrifice important national assets. No tolerably short transition is likely. If it were, we would already have seen the companies involved taking steps to prepare for their new economic endeavors. The wall of separation and the unusual business culture that has grown up behind it block a switch to commercial markets.

Adjustment is further hampered by the extraordinary degree of regional concentration of defense-oriented plants. Their physical isolation from civilian industrial districts makes it harder for managers to pick up new ideas and harder for workers, whether engineers or machinists, to find new jobs. Precisely because of these rigidities in the market, piecemeal attempts at conversion policy, such as the funding set-aside in the Defense Authorization Act of 1992 for retraining, commu-

nity adjustment, and dual use technologies, will not make a dent in the larger structural problem.

Substantial cuts in defense spending in the 1990s, without strenuous and innovative shepherding by government, will be indigestible. They will exacerbate stagnation in the American economy. Without a vision of where the American economy is going, including an anticipation of its sectorial structure and an agenda for the investigation of new technologies, the abrupt scrapping of physical plant and workforces carefully constructed over more than four decades will only deepen the tendency toward deindustrialization already experienced in the steel, autos, machinery, metals, consumer electronics, textiles, and apparel sectors. This would be ironic, since it was public support for the ACE complex at the expense of civilian industries that hastened the latter's downward slide.

The strategy must include an explicit commitment to a new set of publicly financed social missions that replace the demand-driven stimulus provided in the past by the defense budget.

Without substantial help to restructure and re-orient themselves, the military manufacturing sectors will continue to behave as they did in the late 1980s—seeking to diversify through acquisitions, lobbying militantly for restraint in defense cutbacks and for new foreign policy doctrines necessitating future military operations (Klare, 199 1), laying off workers, moth-balling plants, and hunkering down to wait for another military spending boom.

To address this unprecedented situation, a three-pronged strategy is called for: the creation of new markets, new directions for R&D, and adjustment policies linking up new growth sectors with displaced workers and former defense-dependent communities.

First, as a major innovation over past approaches to adjustment, the strategy must include an explicit commitment by government to a new set of publicly financed social missions that replace the demand-driven stimulus provided in the past by the defense budget. Candidates include the environment, health, housing, transportation, infrastructure, education, and world development.

Second, it must exploit the precious resources stored up in the military-industrial complex for the purpose of redirecting public research and development toward the new frontiers

Table 14
Relative Regional Per Capita Military Receipts, 1983

Region	Total Receipts (Dollar Bills)	Procurement Ratio*	Personnel Ratio*	Research Ratio*	Total Ratio
New England	$18.21	2.06	0.74	1.57	1.44
Mid-Atlantic	24.18	0.83	0.44	0.61	0.64
East North Central	18.02	0.45	0.44	0.14	0.43
West North Central	15.03	1.07	0.60	0.91	0.85
South Atlantic	53.38	0.97	1.67	2.27	1.35
East South Central	10.05	0.53	0.84	0.41	0.66
West South Central	23.39	0.81	1.08	0.21	0.89
Mountain	18.40	0.96	2.08	1.14	1.47
Pacific	56.69	1.85	1.40	1.75	1.66

*The ratios represent the regions' per capita receipts divided by the national per capita expenditure for 1983.

Source: Jay Stein, "U.S. Defense Spending: Implications for Economic Development Planning." Working Paper. Georgia Institute of Technology, City Planning Program, 1985: Table 3.

represented by these nonmilitary missions.

Third, it must generate adjustment policies for specific plants, occupations, and communities to engage the economic missions of the next century.

New Social Missions

The existence of a staunch American commitment to defense had a profound and systematic organizing effect on economy in the post-war period. For decades a sizable segment of American business knew what their market was apt to be in the future. Another segment of would-be entrepreneurs could expect with reasonable probability R&D and specialized equipment sales to the government. By virtue of such R&D, new civilian commercial terrain would open up.

Two generations of young scientists and engineers could count on certain areas of expertise-aeronautics, physics, electrical engineering-to offer exciting and lucrative careers. Simply put, from the early 1950s on, the Pentagon budget offered a high-tech core of aircraft, communications, computing, and electronics projects around which American manufacturing strength was fashioned in the subsequent half century.

It is the central role of government purchases in this history that makes the end of the cold war so problematic for the economy. Most prescriptions for post-cold war economic strategy are limited to supply-side initiatives-redirection of R&D to civilian technologies, investing in public infrastructure, technical assistance and aid to

companies to restructure, retraining funds for workers, and helping communities to diversify. However, it was the potent combination of government R&D and the high probability of sales that drove the creation of the great aerospace companies. Although companies often considered R&D contracts relatively unprofitable, they entered into them to secure the follow-on contracts, which would be larger by a factor of 10.

In the next half century, a similar public vision of common goals will be necessary to provide the organizing principles for restructuring the economy. This vision will have to be backed up by public procurement commitments and by non-financial practices and priorities, just as defense goals have been in the past. This need not be as expensive a proposition as the cold war, and government need not create all the markets. Furthermore, if the technologies involved were to be closer in nature to those sought after by civilian sectors, the spin-off of new techniques to the latter would be faster and more effective.

*The looming environmental crisis presents the **opportunity** for the United **States to** be **a** world leader.*

It is fairly clear what the nation's and the world's greatest priority areas are at present. First, there is the looming environmental crisis, which has become a potent political issue and which presents the opportunity for the United States to be a world leader. Investment in technologies and projects to diminish air pollution through new energy and transportation modes, cut down on hazardous waste production through new materials innovation, and enhance recyclability (again through new materials and new production processes) would provide new markets for defense and civilian companies. Although new investments and refurbishing of skills would undoubtedly be necessary, the expertise embodied in existing equipment and workforce in the defense industries could reasonably be devoted to these types of projects.

A second priority is the growing crisis in health care. This is not merely a question of social insurance schemes, however important they may be, but of the entire approach to health embedded in the American medical delivery system. Initiatives to find preventions and cures to major illnesses like cancer and

AIDS, to improve nutrition and resilience to disease generally, and to explore selective technologies that promise to alleviate serious health problems would complement the existing medical system. It could, by lowering the risk of serious illness and the incidence of disease, lower the overall cost of health care, restructuring a system which is currently focused heavily on remedial interventions, curatives, and expensive (and generally short-term and debilitating) life-prolongation.

A third priority is world development. This may at first glance seem a strange goal for an economy beleaguered by internal problems, reeling from a decades-long fall in real wages, and made anxious by the meteoric rise of the Asian, newly industrialized countries (NICs). A major contributing factor to the stagnation of the American economy in the 1980s, however, was the slippage of promising economies like that of Brazil into increased poverty and low growth rates. The improvement of output, productivity, and incomes in Third World countries would have a strong stimulative effect on the American economy, which is still among the world's premier exporters of capital goods and equipment for agriculture, industry and service sectors. Furthermore, developing countries should be rewarded for ending arms purchases and production rather than egged on to buy them, as they are under the current push to export American-made arms.

The devotion of some portion of the peace dividend to encouraging balanced global development would be a sound investment for the nation.

Third World development depends on a new round of investments in plant, infrastructure, and human capital. Such investment could be evenhandedly devoted to domestic market expansion and exports, transcending the much-envied, exclusively export-oriented model exemplified by Korea, Taiwan, Singapore, and Malaysia.

As the economist Charles Tiebout once pointed out, the world as a whole cannot have a surplus of exports (Tiebout, 1975). Domestic market growth in developing countries, made possible by higher incomes, standards of living, and productivity, should be a major goal of American economic policy. The devotion of some portion of the peace dividend to encouraging balanced global development would be a sound investment for the nation.

In the same vein, a Marshall Plan for Eastern Europe and the former Soviet economies would have a similar rebound effect on the American economy. The first Marshall Plan following World War II used American funds to help rebuild Japanese and European infrastructure. The aid powerfully stimulated the American economy through new orders for machinery and equipment. These countries have the educated workforce necessary to revitalize quickly, but they are badly in need of capital.

A large backlog of deferred infrastructure projects now awaits the nation's attention. Funding them would do much to revitalize American industry.

Infrastructure, a supply-side factor, also deserves a chunk of the peace dividend. The flooding of tunnels under the city of Chicago during Easter week of 1992 illustrated powerfully that the neglect of maintenance and upgrading can result in the loss of millions of dollars in business in short order. Recent research shows that military spending is negatively correlated with public investment in infrastructure and that private sector productivity is positively correlated with the provision of public infrastructure (Arsen, 1992; Aschauer, 199 1). In the 1980s, in particular, public investments were foregone for the sake of adding billions to the military budget. A large backlog of deferred infrastructure projects now awaits the nation's attention. Funding them would do much to revitalize American industry.

The missions just laid out are meant to be illustrative. We could easily add housing, transportation, and education to the list, but this is for the nation to decide. The point is to commit ourselves to new missions. The federal government must provide the leadership and the vision. Long-term commitments, not single-year appropriations, should to be made, as in the cold war.

A New Research and Development Strategy

In the 1980s the powerful government role in shaping research and development, albeit military in character, came to be widely recognized. Some analysts welcomed this and argued for its extension to programs such as the Strategic Defense

Initiative, the Strategic Computing Initiative, and the Sematech cooperative research effort, all of which are funded by the Pentagon (Charles, 1988). Critics argue that R&D priorities have been distorted by military missions, and that as military research has become more esoteric, commercial spin-offs have dwindled (Stowsky, 1986; Pascal1 and Lamson, 199 1). A new Civilian Technology Agency has been proposed to support basic nonmilitary technology. Supporters of the Department of Defense's Advanced Research Projects Agency (DARPA) respond that although a civilian agency might be preferable, Americans would not sanction great expenditures under any other rubric than "national defense." Despite disagreement over the appropriate institutional form, a consensus is growing that government intervention in technology development is key to the nation's economic prospects (Zysman, 1990). In the past few years, a compromise approach has emerged that would support "dual use" technologies showing promise in both military and civilian fields (Branscomb, 1990). Such a focus on technology detached from industrial policies so essential to the success of ACE is a risky and likely disappointing strategy. Without guaranteed markets for the products of research, protection from import competition, solicitude for firm survival, and increased worker education and training, new technologies may fizzle before reaching commercialization, even as firms in other nations pick up these technologies and, with support from their governments, carry them to fruition. The dual-use record is rife with failure and disappointment, from the American investment in nuclear power to the failure of Pentagon-bred robotics to ensure American commercial pre-eminence (Nimroody, Hartung, and Grenier, 1988). Dual use has not worked well for the Japanese either. After sinking billions into an attempt to build an aerospace industry in the 1970s, they settled for making aircraft parts domestically but importing fighters and commercial jets (Samuels and Whipple, 1989).

The dual-use record is rife with failure and disappointment, from the American investment in nuclear power to the failure of Pentagon-bred robotics to ensure American commercial pre-eminence.

An R&D policy driven by clear social needs would be preferable (Yudken and Black, 1990). Instead of a single Civilian Technology Agency, detached from agencies respon-

sible for substantive areas, a needs-based policy could decentralize technology policy among competing line agencies. For instance, the departments of Health and Human Services, Energy, and Transportation could augment their divisions for research and development, fostering a competition among agencies to demonstrate progress and efficiency in the deployment of public funds (Markusen and Yudken, 1992, Chapter 9).

An Activist and Self-Liquidating Adjustment Apparatus

To help the economy digest this vigorous new program, national leadership will be required, In wartime the national government set up agencies to orchestrate the conversion of civilian production capacity to military missions, and these same institutions (the War Production Board of World War II, for example) helped to plan for and oversee reconversion after hostilities ceased.

It would be unreasonable fo expect a Department of Defense committed to defense priorities to oversee conversion.

It would be unreasonable to expect a Department of Defense committed to defense priorities to oversee conversion. The Department has no expertise in civilian production and would typically have a fundamental conflict of interest, preferring to see capacity moth-balled for future contingencies rather than converted to nonmilitary uses. As Secretary Cheney has stated, the Pentagon is a military organization, not a social welfare agency (Schmitt, 1992, p. 1). The Pentagon's foot-dragging on the recent $200 million adjustment package is clear proof of DOD indifference, if not hostility, to the responsibility for conversion planning.

The history of the Pentagon's Office of Economic Adjustment is also telling. OEA's funding has frequently been targeted for elimination in DOD budget requests. Its funding has always been secured in the appropriations process by a Congress worried about adjustment. OEA has done a good job of providing planning assistance to communities with base-closings. It is reluctant, however, to take on the burden of industrial facilities because it lacks expertise in commercial competition.

Nor are the departments of Labor or Commerce good choices to be the lead agency. The Department of Labor helps individual workers, but it has no experience in alternative use planning. The Department of Commerce would be more appropriate in principle, but its Economic Development Administration was decimated in the 1980s. Most innovations in development have been made without Federal support by state and local governments, and this experience should be enhanced, not pre-empted by the national government.

Successful conversion means more than just worker retraining or economic diversification for local areas. The most challenging task is linking adjustment policies to emerging technological and industrial initiatives, Tough questions include the following: Should conversion assistance be confined to communities and workers supported by defense contracts, or should workplaces adversely affected by defense-inflated wages, higher interest rates due to defense-bloated deficits, and the absence of government R&D patronage be eligible too? Should workers be required to relocate to new jobs, or should job creation be targeted to where they live? Should new research and procurement programs in energy or the environment favor heavily defense-dependent companies or be open to competition from all comers?

A temporary Office of Economic Conversion should be formed outside of any cabinet agency and responsible directly to the President.

The enormity of the problem, the bewildering potpourri of proffered remedies, and the abysmal record of conversion to date suggest a need for a new independent office. To achieve conversion efficiently, a temporary Office of Economic Conversion should be formed outside of any cabinet agency and responsible directly to the President. It would play a leadership role by crafting policy, reviewing government programs, and helping state and local governments.

The office could generate badly needed data on forthcoming cuts and their probable impact. It would evaluate recent and ongoing conversion efforts at military bases and industrial facilities, about which little is known. It would organize task forces to advise Congress and the President on effective solutions to the worker adjustment problem, to the conversion challenge for individual firms and to the community diversifi-

cation dilemma. It would coordinate existing programs of the departments of Labor, Commerce, and Defense, and help local governments establish access to federal agencies and programs.

The Office of Economic Conversion should have an advisory body which includes representatives from business, labor, professional associations of scientists and engineers, state and local economic development offices, community groups, and peace and veterans' organizations. The advisory council, in cooperation with the Office, would develop recommendations based on task force research and deliberations, and would help to design new programs for presentation to the administration and Congress. The agency would be scheduled to terminate its operations after a pre-defined conversion period in the neighborhood of 10 years. Most of its goals would be achieved through technical assistance and aid to state and local organizations.

A more comprehensive strategy to ward worker retraining should be a priority for legislative initiatives.

Two principal types of new adjustment assistance that the Office might tackle as legislative proposals are:

- A workable plan for alternative use planning at the plant and facility level. Some good propoals are on the drawing boards but they do not contain the carrots and sticks that would en sure that managers, workers and communities work together. Offers of technical assistance (for marketing studies, drawing up business plans, or financial packaging) on a site-by-site basis could be tied to the establishment and verified progress of alternative use committees. In addition, firms with ongoing defense contracts could be required to engage in such planning in concert with workers and economic development officers, just as they are now permitted to use public R&D funds for their own ends. The Office should aim to change attitudes toward conversion on the part of defense contractors. It would work with state and local economic development offices that run technical assistance programs to elicit cooperation and tackle the "business culture" problem.

- A more comprehensive strategy toward worker retraining should be a priority for legislative initiatives. The modem factory and the post-modem office require language and analytic skills not common to today's workforce. The design of a superfund to provide tuition, loans, and stipends to finance college education for workers would be a major and very promising project.

Other important tasks of an office of Economic Conversion would include the enumeration of existing and endangered military industrial capacity, an analysis of the inventory of physical and human capital in each case, and the establishement of a research and evaluation program to respond to state/local requests and to monitor progress. Good data on the potential for conversion and its progress are hard to come by. Such data would dramatically improve the design and conduct of conversion.

Military conversion could be a model for the more general industrial restructuring needed by the American economy.

A high visibility conversion effort would go far toward convincing the military-dependent sector of the economy that the nation is committed to a new path, with dollars and ideas to back it up. Yet the target need not be confined indefinitely to military-oriented companies. Other sectors of the economy hace suffered from the neglect implicit in defense-led innovation and industrial policy. Civilian industries and firms should have the opportunity to bid on new frontier projects, to receive technical assistance, and to tackle their own conversion problems. After some experimentation, the worker superfund should extend its retraining benefits to those in nonmilitary sectors. Military conversion could be a model for the more general industrial restructuring needed by the American economy.

Conclusion

The nation has been paralyzed in the face of its economic and budget challenges. In the spring of 1992, Congress restored funding for expensive, mission less programs like the

B-2 Stealth bomber and the Seawolf submarine, respectively slated to consume $3 billion and $4 billion, solely because tens of thousands of workers' jobs and several companies' survival were at stake. Such behavior shows that the peace dividend will not materialize without a mechanism to facilitate adjustment. Instead, the potential savings of $150 billion a year will be a procurement bonanza for the Pentagon that does nothing to help the economy in the long run. Afterwards, the same workers will face unemployment, and the nation will own new white elephants and be deeper in debt.

We favor a peace effort as concerted as past war efforts. If 50 percent defense cuts were achieved, $150 billion a year in public resourses would be available.

In many ways the United States' predicament parallels that of the former Soviet Union. Both face the necessity to convert highly sophisticated and performance-oriented capacity, as well as human labor, into commercially viable activities. In the former USSR, the costs of de-coupling security from armed might are high because the conversion apparatus itself is highly inefficient. Savings from cutting the defense budget are consumed not by citizens but by former Soviet defense industries in the process of conversion. (Nelson, 199 1, pp. 4, 7).

The difficulty of the conversion problem is that it is fundamentally a supply-side phenomenon. The United States has created an enormous capacity for designing and producing weaponry. This capacity is state-of-the-art (in a technical sense) and a precious resource. Because it is concentrated in particular industries, companies, and regions, a powerful lobby has congealed around it. Without new markets to which this capacity can be devoted, an arms build-up not unlike the one that has already exhausted our economy could ensue, this time in response to dubious threats from Third World countries.

It is not hard to imagine a new foreign policy posture to sustain the military economy: the United States as the world's policeman. Such a stance interacts perversely with the arms export motive, with the U.S.-Iraq relationship a potent case in point. Arms exported to friends arm tomorrow's enemies,[23] which increases the need for U.S. defense spending, which supports a military economy that thrives on arms exports, and

so on. This "Saddam cycle" renders less tractable our problems with budget deficits and competitiveness.

We favor a peace effort as concerted as past war efforts. If 50 percent defense cuts were achieved, $150 billion a year in public resources would be available for solving problems in social services, infrastructure, educational, and deficit reduction.[24]

To launch the economy on a new developmental trajectory, at least half of these savings should be redirected to such new frontiers as were proposed. A reasonable distribution of funds would be $40 billion for new projects on the environment, health and world development fronts, $20 billion for infrastructure and education, $10 billion for civilian R&D initiatives closely linked to the other new social goals, and $5 billion for firm, worker and community adjustment (many times the $200 million currently devoted to the latter ends). Without increasing the deficit, such expenditures would improve the long-term prospects for the American economy, something not possible with nonproductive military expenditures.

At the dawn of the next century, we will either enjoy a richer and more peaceful world or be tightening our belts to launch a host of expensive weapons for new confrontations with Third World nations whose peoples have been similarly impoverished for the aggrandizement of their military establishments. It is a stark choice, and one which must be made now. An economy redesigned for growth, health, environmental quality, and world peace is attainable through the window of opportunity opened by the end of the cold war.

Endnotes

1. In general, CBO has favored the use of defense savings for deficit reduction as a long-term solution to the dearth of private investment in the United States.

2. Budget authority is defined in the *Budget of the United States Government* as "the authority provided by Federal law to incur financial obligations that will result in outlays." Outlays are simply a measure of actual spending or payments for the obligations that government enters into with individuals and companies. The authority to spend is granted prior to outlays being made. Thus, reductions in Defense Department outlays such as payments to contractors and salary to armed service personnel lag behind the reductions in budget authority granted to the Pentagon by Congress. Adams (1992) reports that for every dollar of funding for defense in a given year, only 65 cents is spent concurrently.

3. 'Realignment' of a base refers to a significant increase or decrease in associated personnel or military activities.

4. These estimates do not include savings from force drawdown, only savings from base operating support, infrastructure, and related costs.

5. Les Aspin constructed a "threat-based" approach to U.S. defense needs which begins be compiling all conceivable threats to U.S. security and the determining what defense forces would be needed to counter these threats. By this method, Rep. Aspin found that less than half of the conventional forces allowed for in Pentagon plans would be needed (Aspin, 1992). Kaufmann and Steinbruner (199 1) also propose significantly lower military spending along the same line as Aspin, but they foresee a system of "cooperative security" in which all military establishments are defensively configured and committed foremost to providing mutual reassurance.

6. Cuts of 50 percent in the defense budget would bring the ratio of U.S. defense spending, now around 5.8 percent of GDP closer to the NATO average of 2.9 percent (Lovering, 1990). Even if U.S. military spending fell by half, it would equal the GDP of the Indian subcontinent or of Sub-Saharan Africa (Sivard, 1989).

7. In 199 1 alone, the Bush administration issued permits for $63 billion in new arms sales. Those realized in 1991 will reach $41 billion, an enormous jump up from the $10 to $20 billion exported annually in the 1980s. See Hamilton, 1992: E67, *The Defense Monitor*, Volume 20, No. 4, p. 1, and Hartung, 1991, p. 14.

9. Cite the Tobin petition of 100 economists.

10. See Chapter 2 of Phillips (1991, p. 2), on growing inequality of income.

11. The Buy America Act dates from 1933, when Congress imposed penalties on government agencies who preferred foreign equipment over domestic equivalents, giving domestic firms a cushion of between 6 and 12 percenti n cost differentials. Perhaps even more important, the "specialty metals clause", of the Defense Appropriations bill effectively closes the U.S. market to foreign producers by requiring all arms components to include American specialty metals. The defense marketplace is more protected than most, resulting in fewer leakages of consumption spending from the U.S. economy in the form of imports.

12. Other, exogenous forces would produce a small rate of growth in the CBO forecasts, but any stimulus due to a fall in projected interest rates because of deficit reduction would not come until late in the decade.

13. A firm could enjoy a large absolute level of receipts from defense work while doing most of its business in nondefense areas, so a firm with high receipts is not necessarily "defense dependent."

14. A General Accounting Office study found that salaries of executives in 12 aerospace companies producing for the military were 42 percent higher than those in comparable civilian firms (Center for Defense Information, 1987: 2). Employees of military-related firms tend to have relatively high levels of compensation and low levels of productivity, where the latter is defined as value-added per employee (Blank and Rothschild, 1985, p. 691). At the same time, military firms are more profitable than their civilian counterparts when measured by return on investment (DOD Defense Financial and Investment Review cited in Difillippo, 199 1: 5). Corruption among military contractors is common. Between 1983 and 1990, twenty-five top DOD contractors were convicted of crimes stemming from procurement work, many of them on multiple occasions (Difillippo, 199 1: 7).

15. "Pink and grey collar" occupations include technicians, guards, computer programmers, nurses, and cashiers.

16. Some of the bases on the 1988 closure list slated for realignment in fact gained personnel or military functions. Many of the bases on the 1988 closure list were quite small; only about a dozen could be considered major facilities.

17. OEA's "new" net job figure includes jobs which were simply relocated from the surrounding community. Moreover, many of the new jobs at government facilities may have located in the community in any event and

since those who sought OEA assistance would tend to be more successful. Third, OEA does not consider the lost military personnel positions in their calculations; while military personnel interact less with the local economy than civilian employees, they do contribute to the multiplier effects. Finally, the wages of the new jobs were not recorded, barring comparison of these jobs with the jobs at the former base (Hill, 1992).

18. It could be argued that lack of federal government commitment to mass transit aid discouraged companies from investing sufficiently to convert to production of mass transit systems (National Commission for Economic Conversion and Disarmament, 199 1: 3).

19. While Boeing and Grumman's difficulties were highly publicized at the time, both eventually succeeded. Grumman recently manufactured postal trucks for the Post Office and is leading a team researching magnetic levitation for the State of New York (Grumman Sixtieth Annual Report, 1990: 22; McCormack, 1990). Boeing, after its Boston Transit project foundered, went on to build transit cars for Chicago and San Francisco. Note, however, that all the customers in these cases were in the public sector.

20. "Dual use" refers to technologies with the potential for both military and civilian use. Proponents of dual use argue that the Pentagon can support research which will simultaneously improve military readiness and civilian competitiveness. The dual use strategy is seriously flawed, primarily because many critical national needs have no militry counterpart. A national industrial policy dominated by the agenda of a small group of military and civilian high-tech industries is unlikely to address all of the important science and technology needs of the nation (Markusen and Yudken, 1992, pp. 12 1- 13 1).

21. The bills have been introduced by Rep. Ted Weiss (D-NY), DeLaruo (House), Senator Joseph Liberman (D-CT) and Senator Christopher Dodd (D-CT). The focus of the DeLaruo and Lieberman bills is to encourage business to diversify and invest in retraining. Both would set up a defense industrial diversification account for defense businesses which would allow them to deposit a portion of profits into a tax-free account for the purposes of investing in new nondefense plant and equipment or for retraining or continuing education for workers. The Dodd bill provides grants of up to $100,000 to alternative use committees, which include representatives of management, labor, and the community. The Weiss bill originally mandated alternative use committees. The Weiss bill also provides for one-year advance notice of closings, while the Lieberman bill provides a more limited 90-day notice to some employees.

22. Several additional factors contributed to post-World War II conversion success. First, many World War II factories had originally been built for civilian

use and had only to revert to their former use after the war. Thus post-World War II conversion was really "reconversion," becuase companies had known products and known markets to return to (Dumas, 1989, p. 7). Second, effective consumer demand was high, because the full capacity wartime economy had generated high incomes but, because of rationing, had left many consumers with forced savings and cash in hand. Even new industries like aluminun, where capacity had been swollen to supply aircraft demand, found robust civilian markets (Lynch, 1987, p. 17). Finally, unemployment rates remained low in part becausemany women left the labor market. The number of women employed in nonagricultural jobs dropped by 2 million between August, 1945 and February, 1946, while female unemployment increased by only 110,000 (Ball, 1989, p. 18). Others describe the crowding of women - as well as African Americans and older workers - out of the job market as a failure of World War II conversion.

23. The U.S. exported $1.5 billion in arms to Iraq between 1985 and 1990.

24. The arguments for investing the peace dividend back into the American economy in ways that both raise standards of living and increase productivity are stronger than those for simply using it to lower the deficit (Faux and Sawicky, 1990; Eisner, 199 1).

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