

Defense-related employment and spending, 1996–2006

While the post-Cold War contractions in defense spending and employment are easing, reductions in defense spending will continue to affect employment across all industries and occupations through 2006

Allison Thomson

Following the end of World War II, the Cold War and its accompanying arms race provided the U.S. economy with a period of relatively constant defense spending and defense-related employment growth. Real defense spending retrenched slightly in the years following the Vietnam War to a low of \$266.4 billion in 1977, accounting for 6.2 percent of gross domestic product (GDP).¹ Despite the negotiations and subsequent arms limitation treaties during the 1970s and 1980s, tensions remained between the Soviet Union and its sphere of influence and the United States and its NATO allies. Under the philosophy that the best deterrent against aggression is a strong defense, the U.S. Government quickly escalated defense spending in the 1980s. By 1987, U.S. defense spending reached a post-Vietnam War high of \$409.2 billion, or 7.2 percent of GDP. In 1988, the Cold War ended as the winds of change felled the Berlin Wall. With renewed hopes for world peace, nearly 7 million people, roughly 6 percent of the U.S. labor force, whose jobs were tied to defense spending, were suddenly faced with a future of uncertainty.²

The 1987–96 period was marked by severe cuts in defense-related spending and employment. These reductions were felt across most industries and occupations in the economy. Real defense spending fell by \$94.3 billion to 4.6 percent of GDP, and defense-related employment in the

United States retracted by 2.5 million to 3.4 percent of the labor force.³ In 1996, defense-related employment was responsible for 255,000 fewer jobs than the previous post-Vietnam War low in 1977. Of the decline in employment, 42 percent, or 1 million jobs, was in Government—including the Armed Forces, and civilians in the Department of Defense and nondefense agencies. The remainder of the decline in employment (1.5 million jobs) occurred among workers in the private sector. The greatest reductions in the private sector occurred in direct defense-related employment. A significant proportion of the decline in the private sector, 42.5 percent, or 605,000 jobs from 1987–96, is attributed to indirect defense-related employment. These reductions in defense-related spending and employment left few areas of the labor market untouched.

The drastic reductions in defense spending and related employment are beginning to show signs of slowing. BLS projects that defense-related employment will recede from 4.5 million jobs in 1996 to 3.7 million by 2002 and to 3.6 million by 2006. (See table 1.) These estimates are based on projected reductions in real defense purchases of goods and services from \$314.9 billion in 1996 to \$265.4 billion in 2002, and to \$257.3 billion, or 3.0 percent of GDP, by 2006.⁴ The rate at which real defense spending is projected to decline between 1996 through 2006 is significantly slower

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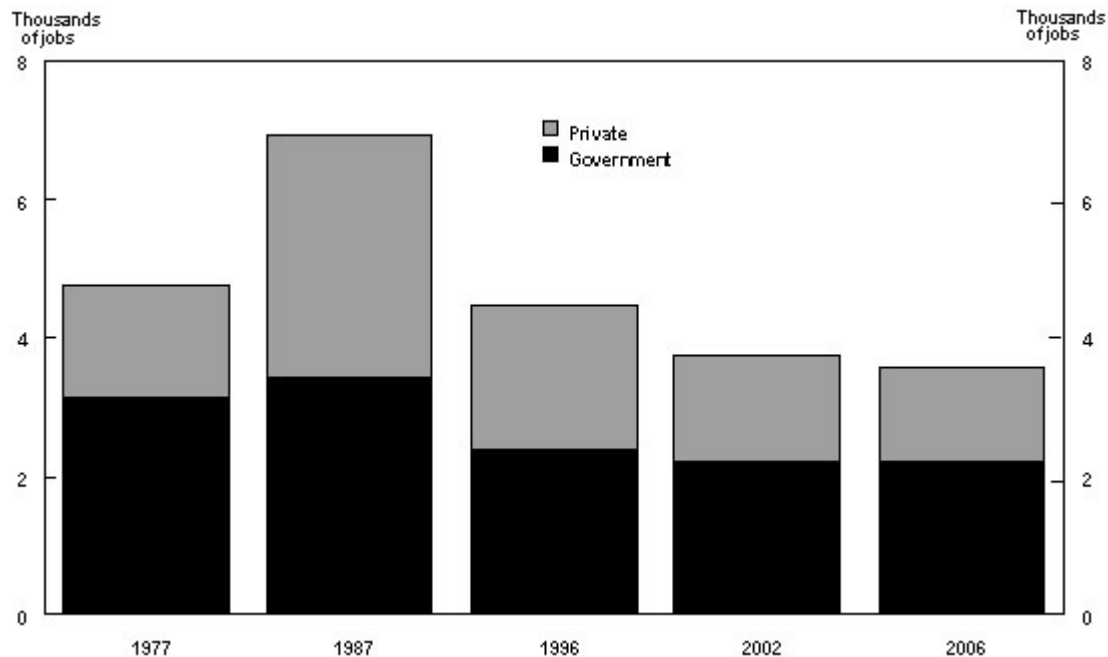
Table 1. Defense purchases and employment in relation to the entire economy, 1977, 1987, 1996, and projected 2002 and 2006

Item	1977	1987	1996	2002	2006	1977-1987	1987-1996	1996-2002	1996-2006	1987-2006
Billions of chain-weighted 1992 dollars										
Gross domestic product ...	\$4,279.3	\$5,648.4	\$6,911.0	\$7,739.9	\$8,539.1	\$1,369.1	\$1,262.6	\$828.9	\$1,628.1	\$2,890.7
Defense purchases	266.4	409.2	314.9	265.4	257.3	142.8	-94.3	-49.5	-57.6	-151.9
Compensation	137.8	155.1	115.9	106.4	106.4	17.3	-39.2	-9.5	-9.5	-48.7
Other defense	128.6	254.1	199.0	159.0	150.9	125.5	-55.1	-40.0	-48.1	-103.
As a percent of GDP										
Defense purchases	6.2	7.2	4.6	3.4	3.0	1.0	-2.7	-1.1	-1.5	-4.2
Compensation	3.2	2.7	1.7	1.4	1.2	-0.5	-1.1	-0.3	-0.4	-1.5
Other defense	3.0	4.5	2.9	2.1	1.8	1.5	-1.6	-0.8	-1.1	-2.7
Thousands of persons										
Total employment ¹	95,588	116,523	133,884	144,646	152,370	20,935.3	17,361.4	10,761.6	18,485.3	35,846.7
Defense related	4,767	6,942	4,492	3,744	3,595	2,174.9	-2,450.4	-747.8	-896.9	-3,347.3
Civilian, Defense Department	1,021	1,122	814	741	741	101.8	-308.3	-73.0	-73.0	-381.3
Civilian, other Government	24	41	23	17	15	17.8	-18.5	-5.9	-7.8	-26.3
Armed Forces	2,071	2,235	1,532	1,443	1,443	163.5	-702.5	-89.2	-89.2	-791.7
Private	1,652	3,544	2,123	1,543	1,396	1,891.8	-1,421.1	-579.7	-726.9	-2,148.0
Directly related	930	1,997	1,180	889	822	1,066.6	-817.0	-290.3	-357.5	-1,174.5
Indirectly related	722	1,548	943	654	574	825.2	-604.1	-289.4	-369.4	-973.5
As a percent of total employment										
Defense related	4.99	5.96	3.36	2.59	2.36	.97	-2.60	-.77	-1.00	-3.60
Civilian, Defense Department	1.07	.96	.61	.51	.49	-.10	-.36	-.10	-.12	-.48
Civilian, other Government .....	.02	.04	.02	.01	.01	.01	-.02	-.01	-.01	-.03
Armed Forces	2.17	1.92	1.14	1.00	.95	-.25	-.77	-.15	-.20	-.97
Private	1.73	3.04	1.59	1.07	.92	1.31	-1.46	-.52	-.67	-2.13
Directly related .....	.97	1.71	.88	.61	.54	.74	-.83	-.27	-.34	-1.17
Indirectly related .....	.76	1.33	.70	.45	.38	.57	-.62	-.25	-.33	-.95

¹ Total employed, including resident Armed Forces, plus Department of Defense estimates of Armed Forces overseas.

NOTE: Derived from BLS projections.

Chart 1. Employment related to defense spending, 1977-96, and projected 2002, and 2006



than the rate at which it declined during the previous decade. The total reduction in defense spending between the post-Vietnam War high in 1987 and the year 2006 is expected to amount to \$151.9 billion. By 1996, \$94.3 billion in cuts had transpired, leaving an additional reduction of \$57.6 billion in defense spending through 2006. The estimates of real defense spending are based on Defense Department projections through 2002, and extended to 2006 based on BLS projections.⁵ Employment attributed to these spending levels is projected to retract by 3.35 million jobs between 1987 and 2006. By 1996, nearly three-fourths of these job cutbacks had already taken place, leaving an expected reduction of another 897,000 jobs through 2006.⁶

The impact of reduced defense spending on overall employment is put in perspective when compared with the 1977–87 defense buildup. During that period, real defense spending increased rapidly by \$142.8 billion, generating 2.2 million additional jobs. More than 283,000 jobs were created in the public sector, while an astounding 1.9 million jobs were produced in the private sector. These gains, shown in chart 1, were erased between 1987 and 1996 in the public sector—among the Armed Forces and civilian defense and nondefense Government workers. The negative impact of defense cutbacks on employment in the private sector over the same period was smaller than the increases experienced during the 1977–87 surge in defense spending. However, defense-related employment in the private sector is still expected to fall throughout the projected 1996–2006 period, and to drop below its 1977 post-Vietnam War low by 2002.⁷

The reductions in defense-related spending from 1996 through 2006 are expected to affect employment in the defense community dissimilarly. In the public sector, employment among the Armed Forces and civilians is projected to decline at a decreasing rate until it achieves a relatively stable level by 2002. In the private sector, direct defense-related employment is expected to continue declining, albeit at a decreasing rate, throughout the remainder of the projection period.⁸

Defense-related employment in the public sector, including the Armed Forces, fell 30.3 percent between 1987 and 1996. The greatest reduction occurred among members of the military, as troop strength fell by 703,000. Ex-

cluding the buildups associated with the Korean and Vietnam Wars, overall troop strength remained relatively constant from World War II up until the end of the Cold War in 1988. The 1987–96 period is the first time reductions in defense expenditures had a direct impact on the size of the Armed Forces. Further reductions among the Armed Forces and civilian Government employees will be tempered by our Nation’s need to maintain a functional level of readiness, ongoing research and development, and weapon modernization programs. Defense-related private sector employment was pared by 40.1 percent between 1987 and 1996. This sector is expected to face an additional reduction of 727,000 jobs through 2006. The primary contraction is expected to transpire in indirect defense-related employment. This differs from the 1987–96 period, during which the greatest reduction occurred in direct defense-related employment.

Industries

The impact of defense spending cutbacks on employment in the major industrial sectors is illustrated in table 2. Excluding the Federal Government, the areas of the economy that are

Table 2. Defense-related employment by major sector, 1977, 1987, 1996, and projected 2002 and 2006

Sector	1977	1987	1996	2002	2006
Level					
Total defense-related employment	4,767.5	6,942.3	4,492.0	3,744.1	3,595.0
Agriculture, forestry, fisheries	11.1	23.8	13.9	10.7	9.9
Mining	21.1	25.3	12.2	8.1	6.7
Construction	100.1	164.0	96.8	79.9	79.5
Manufacturing	965.5	1,801.8	879.2	590.0	493.9
Transportation	96.6	154.5	122.9	90.3	83.8
Communications	23.1	41.1	21.2	13.3	10.7
Public utilities	15.6	27.6	13.2	10.3	9.1
Trade	161.6	329.6	206.2	126.1	102.6
Finance, insurance, and real estate	29.5	80.8	41.2	34.2	32.8
Services	228.2	895.7	716.5	580.4	567.1
Government (including military)	3,115.1	3,398.2	2,368.9	2,200.8	2,198.9
Change					
	1977–87	1987–96	1996–2002	1996–2006	1987–2006
Total defense-related employment	2,174.9	-2,450.4	-747.8	-896.9	-3,347.3
Agriculture, forestry, fisheries	12.7	-9.9	-3.2	-4.0	-13.9
Mining	4.2	-13.1	-4.1	-5.5	-18.6
Construction	63.9	-67.2	-16.9	-17.3	-84.5
Manufacturing	836.3	-922.6	-289.2	-385.3	-1,307.9
Transportation	57.9	-31.6	-32.6	-39.1	-70.7
Communications	18.0	-19.9	-7.9	-10.5	-30.4
Public utilities	12.0	-14.4	-2.9	-4.1	-18.5
Trade	168.0	-123.4	-80.1	-103.6	-227.0
Finance, insurance, and real estate	51.3	-39.6	-7.0	-8.4	-48.0
Services	667.5	-179.2	-136.1	-149.4	-328.6
Government (including military)	283.1	-1,029.3	-168.1	-170.0	-1,199.3

Table 3. Defense-related employment for selected industries, 1977, 1987, 1996, and projected 2002 and 2006

[Thousands of jobs]

Industry	1977			1987			1996		
	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct		Total	Direct	
Civilian employment (excluding military)	2,696.5	1,957.9	2.88	4,707.8	3,127.4	4.12	2,960.0	1,999.3	2.24
Agricultural production	6.9	.0	.25	11.3	.0	.48	6.3	.0	.28
Agricultural services	3.1	.4	.61	9.5	1.3	1.04	6.7	1.4	.51
Forestry, fishing, hunting, and trapping	1.1	.0	1.55	3.1	.0	2.42	.9	.0	1.12
Metal mining	5.3	-.9	5.79	4.0	-1.0	8.67	2.3	-.8	4.12
Coal mining	5.2	.3	2.28	5.3	.4	3.23	1.6	.2	1.69
Crude petroleum, natural gas, and gas liquids	6.7	.0	3.75	10.6	.0	4.93	5.2	.0	3.40
Oil and gas field services	1.3	.0	.59	1.5	.0	.75	.9	.0	.49
Nonmetallic minerals, except fuels	2.7	.0	2.25	3.8	.0	3.37	2.2	.0	2.01
Construction	100.1	88.5	2.07	164.0	141.4	2.58	96.8	90.0	1.40
Logging	2.6	.0	1.84	3.5	.0	2.88	2.0	.0	1.67
Sawmills and planing mills	5.4	.0	2.29	7.0	.0	3.38	3.5	.0	1.88
Millwork, plywood, and structural members	5.0	.0	2.26	8.8	.0	3.18	5.0	.0	1.69
Wood containers and miscellaneous wood products	3.0	.2	2.17	4.3	.2	2.98	2.7	.2	1.67
Wood buildings and mobile homes .....	.9	.2	1.08	.9	.1	1.21	.4	.1	.43
Household furniture	2.0	.2	.62	2.1	.2	.67	1.7	.1	.58
Partitions and fixtures .....	.5	.2	.84	.7	.1	.87	.4	.1	.46
Office and miscellaneous furniture and fixtures .....	.7	.3	.70	.8	.2	.58	.5	.1	.35
Glass and glass products	3.4	.2	1.72	5.5	.2	3.48	3.0	.2	1.98
Hydraulic cement .....	.7	.0	2.06	.7	.0	3.11	.3	.0	1.68
Stone, clay, and miscellaneous mineral products	6.1	.2	2.84	9.2	.5	5.13	5.1	.5	2.80
Concrete, gypsum, and plaster products	4.1	.0	2.01	5.8	.0	2.68	3.2	.0	1.48
Blast furnaces and basic steel products	22.9	.1	4.13	22.1	.0	8.24	10.0	.0	4.13
Iron and steel foundries	11.9	1.2	5.15	12.8	.2	9.86	6.8	.2	5.20
Primary nonferrous smelting and refining	4.6	.0	6.75	5.2	-.1	12.65	2.6	-.1	6.34
All other primary metals	2.9	.3	6.78	5.3	.3	12.43	2.9	.2	6.33
Nonferrous rolling and drawing	11.9	.6	5.95	19.5	.2	10.81	10.1	.2	6.05
Nonferrous foundries	6.6	.2	7.40	15.8	4.9	18.42	9.3	3.3	10.43
Metal cans and shipping containers	1.0	.4	1.20	.9	.3	1.60	.4	.2	1.12
Cutlery, handtools, and hardware	5.8	1.2	3.28	7.5	1.8	5.50	4.2	1.2	3.31
Plumbing and nonelectric heating equipment	2.1	.5	2.91	2.5	.3	3.96	1.3	.2	2.24
Fabricated structural metal products	21.7	10.8	4.55	23.2	5.0	5.44	14.8	3.9	3.25
Screw machine products, bolts, rivets, and others	6.8	.8	6.74	11.9	.9	12.66	6.8	.7	6.71
Metal forgings and stampings	11.3	.5	3.92	15.5	.3	6.67	9.0	.2	3.50
Metal coating, engraving, and allied services	7.0	1.0	7.25	16.3	.0	14.37	9.9	.0	7.33
Ordnance and ammunition	25.9	25.3	44.51	53.2	51.4	69.61	26.0	25.2	54.69
Miscellaneous fabricated metal products	9.8	2.5	3.96	16.3	1.9	7.32	9.1	1.4	3.54
Engines and turbines	12.5	8.1	9.98	17.2	11.2	19.01	7.4	4.9	8.83
Farm and garden machinery and equipment .....	.6	.2	.34	1.7	.3	1.73	.8	.2	.81
Construction and related machinery	5.4	2.8	1.54	8.3	5.2	3.92	4.1	2.6	1.75

Table 3. Continued—Defense-related employment for selected industries, 1977, 1987, 1996, and projected 2002 and 2006

Industry	1977			1987			1996		
	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct		Total	Direct	
Metalworking machinery and equipment	10.4	2.6	2.89	20.7	2.5	6.49	11.1	1.7	3.18
Special industry machinery	2.8	1.2	1.55	2.6	.7	1.65	1.8	.4	1.01
General industrial machinery and equipment	8.7	3.0	3.12	16.4	5.4	6.93	10.2	3.8	3.89
Computer and office equipment	22.7	10.3	7.52	51.8	32.0	11.23	12.3	8.1	3.36
Refrigeration and service industry machinery	2.7	.7	1.51	3.7	.8	2.03	2.3	.6	1.08
Industrial machinery, n.e.c.	12.9	1.2	4.56	57.5	38.6	18.51	34.8	24.4	9.81
Electric distribution equipment	3.3	1.5	2.84	4.9	1.5	4.67	2.3	.8	2.76
Electrical industrial apparatus	13.6	4.9	6.05	19.4	3.8	10.89	8.3	2.1	5.26
Household appliances	1.8	.4	1.02	1.6	.3	1.21	1.1	.2	.88
Electric lighting and wiring equipment	4.9	1.0	2.35	7.7	.4	3.93	4.0	.2	2.24
Household audio and video equipment	2.3	.3	1.83	1.8	.1	2.11	.3	.0	.32
Communications equipment	31.4	23.4	14.96	57.7	40.2	20.49	27.3	18.6	10.03
Electronic components and accessories	42.0	11.0	10.65	177.7	75.4	29.49	70.4	26.5	11.47
Miscellaneous electrical equipment	8.1	5.2	5.70	19.0	11.4	11.44	10.2	7.4	6.65
Motor vehicles and equipment	12.2	9.5	1.29	14.7	9.3	1.69	5.4	2.1	.56
Aerospace	258.1	252.0	46.87	492.3	475.0	55.65	228.0	220.4	41.46
Ship and boat building and repairing	77.7	77.2	33.83	86.5	85.9	45.39	55.7	55.5	34.40
Railroad equipment .....	.6	.0	1.05	.9	.1	3.18	.4	.0	1.10
Miscellaneous transportation equipment	8.2	7.3	10.39	21.4	20.8	33.77	9.9	9.4	13.11
Search and navigation equipment ..	79.3	62.9	30.85	196.8	179.7	58.71	77.3	73.7	46.88
Measuring and controlling devices ..	26.5	18.8	9.69	33.8	15.2	10.85	19.0	7.4	6.41
Medical equipment, instruments, and supplies	2.7	2.1	1.63	3.1	2.1	1.41	2.2	1.4	.82
Ophthalmic goods .....	.8	.2	1.78	.4	.0	1.14	.4	.0	1.06
Photographic equipment and supplies	2.5	1.5	1.91	6.0	4.0	5.61	3.3	2.7	3.93
Watches, clocks, and parts	1.1	.8	3.61	.5	.3	4.10	.5	.4	5.84
Jewelry, silverware, and plated ware .....	.2	.0	.27	.2	.0	.36	.1	.0	.20
Toys and sporting goods .....	.6	.3	.46	1.0	.3	1.0	.4	.2	.34
Manufactured products, n.e.c.	3.3	1.0	1.22	5.1	1.3	2.11	2.9	.9	1.20
Meat products .....	.9	.5	.24	1.4	.4	.34	1.1	.3	.22
Dairy products .....	.3	.1	.15	.5	.1	.30	.3	.1	.19
Preserved fruits and vegetables .....	.3	.1	.12	.5	.1	.23	.4	.1	.15
Grain mill products and fats and oils .....	.7	.1	.35	1.0	.1	.60	.6	.1	.40
Bakery products .....	.6	.2	.25	.9	.1	.41	.6	.1	.29
Sugar and confectionery products ..	.3	.2	.24	.3	.1	.29	.2	.1	.18
Beverages .....	.4	.1	.17	.6	.0	.29	.3	.0	.18
Miscellaneous food and kindred products .....	.5	.2	.32	.7	.2	.41	.4	.2	.23
Tobacco products .....	.0	.0	.01	.0	.0	.02	.0	.0	.02
Weaving, finishing, yarn, and thread mills	9.5	1.3	1.73	9.8	1.4	2.42	5.1	.9	1.52
Knitting mills	2.5	.0	1.06	2.2	.0	1.01	1.4	.0	.77
Carpets and rugs .....	.9	.0	1.48	.9	.0	1.54	.1	.0	.14
Miscellaneous textile goods	1.0	.0	1.56	1.2	.0	2.32	.7	.0	1.27
Apparel	15.0	12.0	1.30	12.2	10.3	1.33	6.7	6.4	1.01
Miscellaneous fabricated textile products	3.1	.8	1.66	4.7	1.5	2.30	3.2	1.2	1.38
Pulp, paper, and paperboard mills ..	4.2	.1	1.60	7.8	.1	3.26	4.1	.0	1.81
Paperboard containers and boxes ..	2.9	.4	1.36	5.4	.3	2.65	3.5	.3	1.61
Converted paper products except containers	2.2	.3	1.02	4.7	.7	2.03	2.7	.5	1.12

Table 3. Continued—Defense-related employment for selected industries, 1977, 1987, 1996, and projected 2002 and 2006

[Thousands of jobs]

Industry	1977			1987			1996		
	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct		Total	Direct	
Newspapers	6.8	.1	1.66	16.2	.1	3.35	7.9	.1	1.73
Periodicals .....	.9	.0	1.12	3.3	.1	2.59	1.9	.1	1.31
Books .....	.6	.2	.59	1.7	.3	1.40	1.2	.3	.85
Miscellaneous publishing .....	.7	.0	1.43	2.6	.1	3.19	1.5	.1	1.63
Commercial printing and business forms	8.9	2.3	2.07	24.0	3.7	3.99	14.9	3.2	2.30
Greeting cards .....	.1	.0	.30	.1	.0	.55	.1	.0	.25
Blankbooks and bookbinding .....	.7	.2	1.14	1.7	.3	2.20	.9	.2	1.33
Service industries for the printing trade	1.0	.0	2.29	3.1	.0	5.06	1.7	.0	2.96
Industrial chemicals	12.4	5.6	3.78	15.0	5.4	5.36	9.0	3.8	3.42
Plastics materials and synthetics ...	5.5	.3	2.56	6.9	.0	4.02	3.8	.0	2.39
Drugs	1.9	1.4	1.06	3.6	2.8	1.69	2.4	1.8	.92
Soap, cleaners, and toilet goods	1.3	.6	1.01	1.9	.7	1.24	1.1	.5	.72
Paints and allied products	1.7	.0	2.64	2.6	.0	4.14	1.2	.0	2.34
Agricultural chemicals .....	.8	.1	1.14	1.0	.0	1.89	.6	.0	1.13
Miscellaneous chemical products ...	4.1	2.2	4.75	6.6	2.4	6.85	4.0	1.8	4.33
Petroleum refining	4.9	2.9	3.05	4.9	2.6	3.92	2.4	1.3	2.39
Miscellaneous petroleum and coal products .....	.9	.0	2.10	1.2	.1	3.02	.7	.0	1.73
Tires and inner tubes	1.9	.3	1.44	3.1	1.3	3.69	1.9	.9	2.31
Rubber products and plastic hose and footwear	8.1	3.6	4.06	9.9	3.0	5.80	6.1	2.2	3.23
Miscellaneous plastics products, n.e.c.	10.4	.7	2.43	26.9	.5	4.55	18.8	.3	2.62
Footwear, except rubber and plastic .....	.3	.2	.15	.4	.3	.41	.2	.2	.48
Luggage, handbags, and leather products, n.e.c. ....	.8	.4	.80	1.0	.5	1.81	.8	.5	1.54
Railroad transportation	14.6	6.5	2.67	10.5	2.9	3.39	4.5	1.6	1.96
Local and interurban passenger transit	1.5	1.2	.51	3.5	.5	1.04	1.4	.8	.30
Trucking and warehousing	50.7	31.0	3.61	85.4	46.6	4.95	59.3	33.8	3.03
Water transportation	11.1	9.0	5.58	7.2	5.1	4.00	4.4	3.8	2.41
Air transportation	14.1	8.4	3.61	35.4	17.2	5.85	41.4	23.8	3.67
Pipelines, except natural gas .....	.5	.1	2.81	.7	.1	3.72	.3	.1	2.34
Passenger transportation arrangement	1.5	.0	1.83	6.0	.0	3.42	5.8	.0	2.57
Miscellaneous transportation services	2.8	.0	3.26	5.9	.0	4.25	5.6	.0	2.64
Communications	23.1	9.0	1.94	41.1	15.0	3.18	21.2	7.2	1.55
Electric utilities	10.4	4.3	2.31	18.5	6.1	3.21	7.1	3.1	1.49
Gas utilities	3.8	.5	1.78	6.3	1.5	2.97	3.2	1.3	1.79
Water and sanitation	1.4	.8	1.60	2.9	.9	2.02	2.9	.9	1.21
Wholesale trade	98.4	33.4	1.97	213.5	67.5	3.46	124.2	32.7	1.83
Retail trade except eating and drinking places	41.2	.9	.37	60.0	2.5	.44	38.2	1.8	.25
Eating and drinking places	21.9	5.5	.51	56.1	10.7	.88	43.8	8.8	.57
Depository institutions	10.3	.0	.63	30.7	.0	1.36	13.3	.0	.65
Nondepository; holding and investment offices	3.4	.0	1.12	8.5	.0	1.47	4.9	.0	.67
Security and commodity brokers	1.1	.0	.53	4.3	.0	.82	2.4	.0	.37
Insurance carriers	4.8	.1	.42	10.1	.4	.71	4.8	.2	.32
Insurance agents, brokers, and services	2.1	.0	.42	5.4	.0	.71	2.8	.0	.32
Real estate	7.8	1.7	.74	21.9	2.6	1.35	13.0	2.0	.73
Royalties .....	.0	.0	.00	.0	.0	.00	.0	.0	.00
Owner-occupied dwellings .....	.0	.0	.00	.0	.0	.00	.0	.0	.00
Hotels and other lodging places	20.4	12.0	1.99	46.2	16.4	3.03	29.3	10.4	1.65
Laundry, cleaning, and shoe repair	1.3	.0	.27	5.2	1.5	.99	3.4	1.1	.62
Personal services, n.e.c. ....	.2	.0	.14	.2	.0	.07	.2	.0	.06

Table 3. Continued—Defense-related employment for selected industries, 1977, 1987, 1996, and projected 2002 and 2006

Industry	1977			1987			1996		
	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct		Total	Direct	
Beauty and barber shops .....	.0	.0	.00	.0	.0	.00	.1	.0	.01
Funeral services and crematories ..	.0	.0	.01	.0	.0	.02	.0	.0	.03
Advertising	3.2	.1	2.17	10.8	.2	4.36	6.0	.1	2.18
Services to buildings	19.2	14.3	4.00	17.5	.0	1.95	10.5	.0	.95
Miscellaneous equipment rental and leasing	1.8	.0	2.30	8.2	.0	4.29	6.5	.0	2.37
Personnel supply services	6.6	.0	1.80	124.8	86.1	10.21	144.7	91.8	5.41
Computer and data processing services	7.8	5.0	4.05	58.1	33.8	8.47	50.3	21.8	3.77
Miscellaneous business services ...	15.7	1.1	1.81	96.2	29.8	5.98	74.6	24.1	3.14
Automotive rentals, without drivers .	2.0	.1	1.76	5.6	.1	2.79	3.1	.0	1.55
Automobile parking, repair, and services	3.0	.6	.50	8.7	.8	.91	4.8	.3	.39
Electrical repair shops	2.6	1.6	2.48	2.8	.1	2.02	1.6	.0	1.15
Watch, jewelry, and furniture repair .....	.9	.8	1.26	.4	.4	.45	0.2	.2	.35
Miscellaneous repair services	13.3	8.7	4.88	23.9	13.5	6.96	16.8	10.7	4.39
Motion pictures	5.4	3.6	2.40	12.5	8.2	4.93	10.6	7.0	2.69
Video tape rental .....	.0	.0	.00	.1	.0	.10	.1	.0	.04
Producers, orchestras, and entertainers	2.4	1.3	1.92	7.5	4.1	3.49	4.9	2.8	1.81
Bowling centers .....	.1	.0	.13	.4	.0	.39	.1	.0	.17
Commercial sports .....	.0	.0	.04	.1	.0	.12	.2	.0	.18
Amusement and recreation services, n.e.c.	2.6	.5	.51	4.4	2.3	.64	4.6	1.7	.38
Offices of health practitioners .....	.0	.0	.00	.1	.0	.00	.0	.0	.00
Nursing and personal care facilities	.3	.0	.04	3	.0	.02	2.2	.0	.12
Hospitals .....	.5	.0	.02	-7.1	-8.2	-.23	-5.2	-5.8	-.13
Health services, n.e.c. ....	.0	.0	.02	.2	.2	.04	.2	.2	.02
Legal services	5.4	.0	.93	23.1	4.5	2.27	12.6	3.9	1.11
Educational services	6.1	5.9	.53	29.8	23.0	1.93	32.9	20.1	1.54
Individual and miscellaneous social services .....	.0	.0	.00	.0	.0	.00	.1	.0	.01
Job training and related services	5.3	3.7	4.02	3.3	.4	1.43	2.7	.2	.87
Child day care services .....	.0	.0	.00	.0	.0	.00	.1	.0	.01
Residential care .....	.0	.0	.01	.0	.0	.00	.0	.0	.00
Museums, botanical and zoological gardens .....	.0	.0	.03	.0	.0	.07	.0	.0	.05
Membership organizations	6.8	.0	.45	11.8	.0	.72	4.7	.0	.21
Engineering and architectural services	10.8	2.6	2.29	102.2	80.7	13.05	67.6	53.0	7.45
Research and testing services	60.7	58.8	19.89	151.3	145.1	31.72	105.5	100.0	18.15
Management and public relations ...	12.1	7.9	4.57	85.1	67.9	14.64	71.4	50.4	6.69
Accounting, auditing, and other services	11.3	4.8	2.28	62.1	31.4	7.92	48.9	29.9	5.17
Private households .....	.0	.0	.00	.0	.0	.00	.0	.0	.00
U.S. Postal Service	13.1	6.2	2.00	24.3	7.6	3.00	14.6	5.1	1.70
Federal electric utilities .....	.9	.0	2.33	1.1	.0	3.24	.4	.0	1.49
Federal Government enterprises, n.e.c. ....	.9	.0	.58	1.6	.0	0.99	.7	.0	.55
Federal general Government	1,020.5	1,020.5	54.37	1,122.3	1,122.3	57.82	814.0	814.0	46.78
Local government passenger transit .....	.6	.0	.52	2.0	.0	1.02	.5	.0	.26
State and local electric utilities	1.4	.0	2.33	2.6	.0	3.25	1.3	.0	1.51
State and local government enterprises, n.e.c.	6.7	.8	1.35	9.7	.9	1.70	5.4	.6	.90
State and local government hospitals .....	.0	.0	.00	.0	.0	.00	.0	.0	.00
State and local government education .....	.0	.0	.00	.0	.0	.00	.0	.0	.00
State and local general government, n.e.c. ....	.0	.0	.00	.0	.0	.00	.0	.0	.00

Table 3. Continued—Defense-related employment for selected industries, 1977, 1987, 1996, and projected 2002 and 2006

Industry	2002			2006		
	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct	
Civilian employment (excluding military)	2,301.3	1,634.4	1.61	2,152.2	1,566.7	1.43
Agricultural production	4.4	.0	.21	3.7	.0	.19
Agricultural services	5.6	1.2	.38	5.6	1.3	.36
Forestry, fishing, hunting, and trapping .....	.7	.0	.90	.5	.0	.76
Metal mining	1.0	-.6	1.95	.6	-.5	1.39
Coal mining .....	.9	.1	1.37	.6	.1	1.10
Crude petroleum, natural gas, and gas liquids	3.8	.0	3.11	3.2	.0	3.08
Oil and gas field services	1.0	.0	.61	1.0	.0	.65
Nonmetallic minerals, except fuels	1.5	.0	1.42	1.3	.0	1.27
Construction	79.9	72.2	1.10	79.5	71.8	1.05
Logging	1.5	.0	1.22	1.3	.0	1.05
Sawmills and planing mills	2.5	.0	1.39	2.3	.0	1.27
Millwork, plywood, and structural members	3.8	.0	1.24	3.6	.0	1.14
Wood containers and miscellaneous wood products	1.8	.1	1.10	1.6	.1	.94
Wood buildings and mobile homes .....	.4	.1	.43	.4	.1	.46
Household furniture	1.0	.1	.37	.9	.1	.33
Partitions and fixtures .....	.4	.1	.38	.3	.1	.34
Office and miscellaneous furniture and fixtures .....	.4	.1	.22	.3	.1	.19
Glass and glass products	1.9	.1	1.36	1.5	.1	1.18
Hydraulic cement .....	.2	.0	1.30	.2	.0	1.19
Stone, clay, and miscellaneous mineral products	3.3	.4	2.00	2.8	.3	1.81
Concrete, gypsum, and plaster products	2.4	.0	1.10	2.2	.0	1.03
Blast furnaces and basic steel products	5.5	.0	2.58	4.0	.0	2.02
Iron and steel foundries	3.8	.1	3.11	2.7	.1	2.36
Primary nonferrous smelting and refining	1.3	.0	3.56	.9	.0	2.56
All other primary metals	1.6	.1	3.65	1.2	.1	2.77
Nonferrous rolling and drawing	5.4	.1	3.39	3.8	.1	2.45
Nonferrous foundries	6.1	2.6	6.88	5.2	2.4	5.81
Metal cans and shipping containers .....	.3	.1	.77	.2	.1	.66
Cutlery, handtools, and hardware	2.7	.9	2.30	2.2	.8	1.96
Plumbing and nonelectric heating equipment	1.0	.2	1.73	.9	.1	1.61
Fabricated structural metal products	9.9	3.1	2.19	8.7	2.9	1.92
Screw machine products, bolts, rivets, and others	4.2	.5	4.37	3.3	.5	3.51
Metal forgings and stampings	4.8	.2	2.04	3.4	.2	1.52
Metal coating, engraving, and allied services	5.7	.0	4.07	4.3	.0	2.97
Ordnance and ammunition	18.6	17.9	42.09	14.9	14.2	35.50
Miscellaneous fabricated metal products	5.8	1.1	2.29	4.7	1.0	1.88
Engines and turbines	4.8	3.3	6.14	3.8	2.8	5.22
Farm and garden machinery and equipment .....	.6	.1	.63	.5	.1	.57
Construction and related machinery	2.6	1.9	1.09	2.2	1.6	.87
Metalworking machinery and equipment	6.6	1.4	1.88	4.8	1.3	1.38
Special industry machinery	1.0	.3	.55	.8	.3	.46
General industrial machinery and equipment	6.4	2.9	2.50	5.3	2.6	2.10

Table 3. Continued—Defense-related employment for selected industries, 1977, 1987, 1996, and projected 2002 and 2006

[Thousands of jobs]

Industry	2002			2006		
	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct	
Computer and office equipment	5.4	3.8	1.62	1.5	1.1	.48
Refrigeration and service industry machinery	1.5	.5	.67	1.2	.4	.55
Industrial machinery, n.e.c.	23.0	17.9	6.19	19.1	15.6	4.99
Electric distribution equipment	1.5	.6	2.01	1.2	.6	1.80
Electrical industrial apparatus	4.0	1.5	2.92	2.6	1.2	2.08
Household appliances	6	.1	.58	.5	.1	.48
Electric lighting and wiring equipment	2.5	.2	1.45	1.9	.2	1.18
Household audio and video equipment .....	.2	.0	.25	.2	.0	.23
Communications equipment	16.6	11.9	6.32	12.4	9.0	4.83
Electronic components and accessories	40.6	17.4	6.12	27.4	12.0	3.91
Miscellaneous electrical equipment ...	6.6	4.9	4.31	5.2	3.9	3.43
Motor vehicles and equipment	3.3	1.5	.35	2.7	1.3	.29
Aerospace	183.6	178.6	31.82	173.4	169.0	29.09
Ship and boat building and repairing	41.1	40.9	26.91	36.7	36.6	25.01
Railroad equipment .....	.2	39.6	.50	.2	.0	.36
Miscellaneous transportation equipment	7.0	6.6	8.78	6.0	5.7	7.32
Search and navigation equipment	37.4	33.6	28.54	25.1	21.7	22.35
Measuring and controlling devices	10.6	5.0	3.84	8.1	4.1	3.05
Medical equipment, instruments, and supplies	1.7	1.1	.58	1.6	1.0	.50
Ophthalmic goods .....	.2	.0	.59	.1	.0	.43
Photographic equipment and supplies	2.3	1.9	3.11	1.8	1.5	2.72
Watches, clocks, and parts .....	.3	.2	4.99	.3	.2	4.90
Jewelry, silverware, and plated ware .....	.1	.0	.25	.1	.0	.25
Toys and sporting goods .....	.4	.1	.30	.4	.1	.27
Manufactured products, n.e.c.	2.0	.7	.83	1.7	.6	.70
Meat products .....	.9	.3	.16	.8	.3	.14
Dairy products .....	.2	.1	.14	.2	.0	.12
Preserved fruits and vegetables .....	.2	.0	.09	.2	.0	.08
Grain mill products and fats and oils .....	.4	.1	.27	.4	.1	.24
Bakery products .....	.4	.1	.19	.3	.1	.16
Sugar and confectionery products .....	.1	.1	.14	.1	.1	.12
Beverages .....	.2	.0	.10	.1	.0	.08
Miscellaneous food and kindred products .....	.3	.1	.15	.3	.1	.13
Tobacco products .....	.0	.0	.00	.0	.0	.00
Weaving, finishing, yarn, and thread mills	3.8	.7	1.19	3.3	.6	1.07
Knitting mills	1.2	.0	.69	1.1	.0	.66
Carpets and rugs .....	.2	.0	.23	.2	.0	.21
Miscellaneous textile goods .....	.4	.0	.89	.4	.0	.75
Apparel	5.1	4.8	.93	4.5	4.2	.93
Miscellaneous fabricated textile products	2.5	1.0	1.02	2.3	.9	.90
Pulp, paper, and paperboard mills	2.6	.0	1.22	2.1	.0	1.02
Paperboard containers and boxes	2.4	.2	1.04	2.1	.2	.86
Converted paper products except containers	1.9	.4	.78	1.7	.4	.66
Newspapers	5.0	.1	1.17	4.0	.1	.98
Periodicals	1.3	.0	.85	1.0	.0	.69
Books .....	.8	.2	.56	.7	.2	.46
Miscellaneous publishing .....	.9	.1	1.02	.7	.1	.82

Table 3. Continued—Defense-related employment for selected industries, 1977, 1987, 1996, and projected 2002 and 2006

[Thousands of jobs]

Industry	2002			2006		
	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct	
Commercial printing and business forms	10.3	2.3	1.59	8.8	2.1	1.36
Greeting cards .....	.1	.0	.17	.1	.0	.16
Blankbooks and bookbinding .....	.7	.2	.98	.6	.2	.84
Service industries for the printing trade	1.1	.0	2.07	.8	.0	1.69
Industrial chemicals	6.3	2.9	2.42	5.6	2.8	2.14
Plastics materials and synthetics	2.2	.0	1.48	1.7	.0	1.20
Drugs	1.8	1.4	.61	1.7	1.4	.53
Soap, cleaners, and toilet goods .....	.8	.4	.50	.7	.4	.44
Paints and allied products .....	.8	.0	1.54	.7	.0	1.26
Agricultural chemicals .....	.4	.0	.78	.4	.0	.69
Miscellaneous chemical products	2.7	1.3	3.08	2.3	1.2	2.74
Petroleum refining	1.5	.8	1.70	1.1	.6	1.43
Miscellaneous petroleum and coal products .....	.5	.0	1.20	.4	.0	1.06
Tires and inner tubes	1.2	.7	1.74	.9	.5	1.55
Rubber products and plastic hose and footwear	3.9	1.6	2.14	3.2	1.4	1.79
Miscellaneous plastics products, n.e.c.	13.6	.3	1.70	11.7	.2	1.36
Footwear, except rubber and plastic .....	.2	.1	.45	.2	.1	.48
Luggage, handbags, and leather products, n.e.c. ....	.5	.3	1.20	.4	.2	1.13
Railroad transportation	2.9	1.1	1.35	2.2	.9	1.11
Local and interurban passenger transit	2.4	.5	.44	2.3	.5	.40
Trucking and warehousing	43.1	25.1	2.06	39.7	23.2	1.82
Water transportation	3.1	2.6	1.71	2.6	2.2	1.49
Air transportation	29.6	17.5	2.30	27.8	17.8	1.97
Pipelines, except natural gas .....	.2	.1	1.58	.2	.1	1.36
Passenger transportation arrangement	4.2	.0	1.58	3.9	.0	1.34
Miscellaneous transportation services	4.9	.0	1.75	5.0	.0	1.48
Communications	13.3	4.9	.97	10.7	4.2	.77
Electric utilities	5.5	2.0	1.15	4.6	1.7	.98
Gas utilities	2.2	.9	1.35	1.9	.8	1.20
Water and sanitation	2.6	.9	.87	2.6	1.0	.74
Wholesale trade	73.6	23.3	1.02	57.1	20.0	.75
Retail trade except eating and drinking places	23.0	1.4	.14	19.5	1.2	.12
Eating and drinking places	29.5	7.4	.34	26.0	7.3	.28
Depository institutions	10.4	.0	.52	9.3	.0	.47
Nondepository; holding and investment offices	4.8	.0	.56	5.5	.0	.58
Security and commodity brokers	2.4	.0	.31	2.4	.0	.28
Insurance carriers	4.2	.2	.26	4.0	.2	.23
Insurance agents, brokers, and services	2.3	.0	.25	2.2	.0	.23
Real estate	10.2	1.6	.53	9.5	1.5	.47
Royalties .....	.0	.0	.0	.0	.0	.0
Owner-occupied dwellings .....	.0	.0	.0	.0	.0	.0
Hotels and other lodging places	24.3	9.9	1.26	23.7	10.3	1.16
Laundry, cleaning, and shoe repair	2.5	0.9	.44	2.2	.8	.39
Personal services, n.e.c. ....	.2	.0	.0	.1	.0	.03
Beauty and barber shops .....	.0	.0	.0	.0	.0	.00
Funeral services and crematories .....	.0	.0	.0	.0	.0	.01
Advertising	4.4	.1	1.50	3.9	.1	1.28
Services to buildings	8.4	.0	.68	7.9	.0	.59

Table 3. Continued—Defense-related employment for selected industries, 1977, 1987, 1996, and projected 2002 and 2006

[Thousands of jobs]

Industry	2002			2006		
	Defense related		Defense-related share of total employment (percent)	Defense related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct	
Miscellaneous equipment rental and leasing	5.2	.0	1.56	4.9	.0	1.32
Personnel supply services	119.9	71.5	3.48	117.9	67.4	2.89
Computer and data processing services	47.0	17.3	2.28	49.8	16.6	1.81
Miscellaneous business services	57.8	18.9	2.10	55.2	18.2	1.81
Automotive rentals, without drivers	2.4	.0	1.06	2.2	.0	.87
Automobile parking, repair, and services	4.1	.2	.28	4.0	.3	.24
Electrical repair shops	1.2	.0	.80	1.1	.0	.68
Watch, jewelry, and furniture repair .....	.2	.2	.27	.2	.2	.24
Miscellaneous repair services	12.9	8.1	3.07	12.3	8.2	2.78
Motion pictures	7.6	5.2	1.69	7.1	5.0	1.46
Video tape rental .....	.0	.0	.02	.0	.0	.02
Producers, orchestras, and entertainers	3.7	2.1	1.14	3.6	2.1	.98
Bowling centers .....	.1	.0	.17	.1	.0	.18
Commercial sports .....	.2	.0	.14	.2	.0	.13
Amusement and recreation services, n.e.c.	3.1	1.7	.21	3.0	1.8	.18
Offices of health practitioners .....	.0	.0	.00	.0	.0	.00
Nursing and personal care facilities ..	.7	.0	.03	.1	.0	.00
Hospitals	-4.1	-4.5	-1.0	-3.9	-4.4	-.09
Health services, n.e.c. ....	.2	.2	.01	.2	.2	.01
Legal services	11.1	2.9	.86	10.6	2.9	.75
Educational services	25.3	17.3	1.05	24.6	17.2	.94
Individual and miscellaneous social services .....	.1	.0	.0	.1	.0	.00
Job training and related services	2.2	.2	.62	2.2	.2	.56
Child day care services .....	.1	.0	.00	.1	.0	.00
Residential care .....	.0	.0	.00	.0	.0	.00
Museums, botanical and zoological gardens .....	.0	.0	.02	.0	.0	.02
Membership organizations	3.0	.0	.13	2.7	.0	.11
Engineering and architectural services	52.9	41.5	5.13	51.4	40.3	4.57
Research and testing services	78.9	73.9	11.72	71.7	66.7	9.65
Management and public relations	65.0	46.9	4.69	67.9	49.3	4.11
Accounting, auditing, and other services	39.8	25.2	3.72	40.2	27.2	3.46
Private households .....	.0	.0	.00	.0	.0	.00
U.S. Postal Service	10.6	3.7	1.22	9.5	3.3	1.08
Federal electric utilities .....	.3	.0	1.18	.2	.0	.96
Federal Government enterprises, n.e.c. ....	.7	.0	.45	.7	.0	.44
Federal general Government	741.0	741.0	44.78	741.0	741.0	46.31
Local government passenger transit .....	.9	.0	.44	.9	.0	.41
State and local electric utilities	1.1	.0	1.14	1.0	.0	.98
State and local government enterprises, n.e.c.	3.4	.4	.63	2.7	.4	.56
State and local government hospitals .....	.0	.0	.00	.0	.0	.00
State and local government education .....	.0	.0	.00	.0	.0	.00
State and local general government, n.e.c. ....	.0	.0	.00	.0	.0	.00

n.e.c. = not elsewhere classified.

Table 4. Industries most heavily dependent on defense spending, 1996

[Percent of total employment]	
Industry	Defense-related share of employment
Ordnance and ammunition	54.7
Search and navigation equipment	46.9
Federal general Government	46.8
Aerospace	41.5
Ship and boat building and repairing	34.4
Research and testing services	18.2
Miscellaneous transportation equipment	13.1
Electronic components and accessories	11.5
Nonferrous foundries	10.4
Communications equipment	10.0
Industrial machinery, n.e.c.	9.8
Engines and turbines	8.8
Engineering and architectural services	7.5
Metal coating, engraving, and allied services	7.3
Screw machine products, bolts, rivets, and others	6.7
Management and public relations	6.7
Miscellaneous electrical equipment	6.7
Measuring and controlling devices	6.4
Primary nonferrous smelting and refining	6.3
All other primary metals	6.3

n.e.c. = not elsewhere classified.

expected to absorb the continued reduction in defense-related employment between 1996 and 2006 are manufacturing (–385,000 jobs), services (–149,000 jobs), and retail and wholesale trade (–103,600 jobs). These industries also experienced large defense-related employment losses during the 1987–96 period. Estimates of defense-related employment by detailed industry are provided in table 3. Over the 1996–2006 period, sizable job reductions are projected for many industries with substantial concentrations of defense-related employment, including the aerospace, search and navigation equipment, shipbuilding, electronic components, research and testing, and engineering and architectural services industries. (See table 4.) Correspondingly, further employment reductions are anticipated in the industries, responsible for supplying goods and services to these industries, such as wholesale trade, construction, computer and office equipment, and trucking and warehousing industries.

The most notable reductions in defense-related employment over the historical and projected periods are in the Federal general Government. (See table 5.) Fewer civilian defense employees are required to manage complex defense procurement programs, and funding for extensive research and development programs is reduced. Nearly 90 percent of the total re-

duction in troop strength from 1987 to the projected year 2006 has materialized. Four rounds of base realignment and closure in 1988, 1991, 1993, and 1995 made substantial progress in eliminating excess military infrastructure. The greatest impact of these closures is felt in smaller communities where many businesses rely directly or indirectly on defense dollars as a primary source of demand for their products. The Department of Defense provides grants and transition assistance to help communities plan for reuse and to attract new civilian employers.

The ongoing reductions in force strength and infrastructure by the Department of Defense are strategically designed to ensure the success of the Armed Forces in carrying out its missions under a constrained budget climate. The Department of Defense budget plan calls for military spending to be greatly reduced across all categories—personnel, operations and maintenance, procurement, research, development, testing and evaluation, revolving and management funds, military construction, and family housing. However, under a climate of fiscal austerity, the military community faces a significant dilemma of how to invest in technology and weapons modernization programs while meeting current obligations. During the previous decade, as funding shrank, money earmarked for modernization was delayed and redirected to pay current bills for operation and support.⁹ In order to replace Cold War-era equipment reaching the end of its service life and to maintain technical superiority with new systems, ongoing investment in modernization, supported by research, development, testing, and evaluation, is essential. To reduce excess operations and maintenance costs further, and to modernize and improve overall readiness by directing available resources to existing forces instead of bases, two more rounds of base realignment and closures are anticipated by the Department of Defense, in 2001 and 2005.¹⁰ Currently, Congress is examining the costs and benefits of maintaining retail activities at military installations.¹¹

Job reductions stemming from the decline in defense expenditures have been, and are expected to continue to be, slightly greater in the manufacturing industries than in the service industries. The manufacturing industries that are projected to be hit hardest are those most heavily dependent on defense spending—aerospace, and search and navigation equipment. Also, the decline in demand for shipping those manufactured goods and constructing base housing and infrastructures will continue to negatively affect employment in the transportation and construction industries.

Among the service industries, employment cutbacks are ongoing in research and testing, engineering and architectural, miscellaneous business, and personnel supply services. These industries traditionally supply the defense community with a broad range of technical knowledge and administrative support. The reduced availability of research funds, the paring

Table 5. Industries with the largest level changes in defense-related employment, 1977–1987 and projected 1987–2006, and 1996–2006

[Thousands of jobs]

Industry	1977–87	1987–96	1996–2002	1996–2006	1987–2006
Federal general Government	101.8	-308.3	-73.0	-73.0	-381.3
Aerospace	234.2	-264.3	-44.4	-54.6	-319.0
Search and navigation equipment	117.5	-119.5	-39.9	-52.2	-171.7
Wholesale trade	115.1	-89.3	-50.6	-67.1	-156.4
Electronic components and accessories	135.8	-107.3	-29.8	-43.0	-150.4
Construction	63.9	-67.2	-16.9	-17.3	-84.5
Research and testing services ..	90.6	-45.8	-26.6	-33.8	-79.6
Engineering and architectural services	91.5	-34.6	-14.7	-16.2	-50.9
Computer and office equipment	29.1	-39.5	-6.9	-10.8	-50.3
Ship and boat building and repairing	8.8	-30.8	-14.6	-19.0	-49.8
Trucking and warehousing	34.7	-26.1	-16.2	-19.7	-45.7
Communications equipment	26.3	-30.4	-10.7	-14.9	-45.3
Miscellaneous business services	80.5	-21.6	-16.8	-19.5	-41.1
Retail trade excluding eating and drinking places	18.8	-21.8	-15.2	-18.7	-40.5
Personnel supply services	118.2	-19.9	-24.8	-26.8	-6.9

Table 6. Defense-related occupational employment by major sector, 1987, 1996, and projected 2002 and 2006

[Thousands of jobs]

Occupation	1987	1996	2002	2006	1987–96	1996–2002	1996–2006	1987–2006
Total, civilian defense-related employment	4,707.8	2,959.8	2,301.3	2,152.3	-1,748.0	-658.5	-807.6	-2,555.6
Executive, administrative, and managerial occupations	586.9	379.2	304.4	289.9	-207.7	-74.8	-89.3	-297.0
Professional specialty occupations	646.8	420.6	357.4	354.0	-226.1	-63.2	-66.7	-292.8
Technicians and related support occupations	297.6	188.9	151.3	144.1	-108.7	-37.5	-44.8	-153.5
Marketing and sales occupations	191.5	141.0	104.3	93.9	-50.5	-36.7	-47.1	-97.6
Administrative support occupations, including clerical	934.5	588.0	454.9	423.0	-346.5	-133.1	-165.1	-511.5
Service occupations	287.7	200.9	155.0	144.0	-86.8	-45.9	-56.8	-143.7
Agriculture, forestry, fishing, and related occupations	45.6	27.7	21.9	20.7	-17.9	-5.7	-6.9	-24.8
Precision production, craft, and repair occupations	851.1	505.5	389.2	361.6	-345.5	-116.4	-143.9	-489.5
Operators, fabricators, and laborers	880.5	517.0	370.5	328.7	-363.5	-146.5	-188.3	-551.8

down of weapons programs, and ongoing base realignments and closures are decreasing the need for the services provided by these industries. Interestingly, employment gains during the 1977–87 defense buildup in the engineering and architectural, miscellaneous business, and personnel supply services industries will not be erased by the projected cutbacks in spending. Firms in these industries provide specific services, such as information system design, risk assessment, or training, on a contractual basis. When their obligations are met, their services are terminated. Contractual hiring provides employers with a smaller, more flexible work force that is able to

adjust effectively to the fluctuations in demand for their services.

Reduced defense spending and employment levels through 2006 are projected to continue having an impact on a variety of other industries. Substantial cuts in employment have already been realized throughout the public sector and in manufacturing and service industries directly involved in defense-related activities. Future reductions in employment are projected to be concentrated in the private sector and include many nondefense-related industries. Many areas of the country are affected by the cutbacks in defense, as funds awarded

Table 7. Defense-related employment by major grouping and selected occupations, 1987, 1996, and projected 2002 and 2006

[Thousands of jobs]

Occupation	1987			1996			2002			2006		
	Defense-related		Defense-related share of total employment (percent)	Defense-related		Defense-related share of total employment (percent)	Defense-related		Defense-related share of total employment (percent)	Defense-related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct		Total	Direct		Total	Direct	
Total, all occupations	4,707.8	3,127.4	4.51	2,959.8	1,998.8	2.43	2,301.3	1,723.7	1.75	2,152.3	1,567.3	1.55
Executive, administrative, and managerial occupations	586.9	412.6	5.79	379.2	273.0	3.23	304.4	240.5	2.36	289.9	221.4	2.12
Accountants and auditors	64.4	42.6	7.81	43.1	30.8	4.83	35.4	27.9	3.72	34.1	26.1	3.45
Budget analysts	16.5	15.5	27.13	11.1	10.5	16.86	9.6	9.7	13.64	9.6	9.2	13.03
Management analysts	26.2	25.0	39.10	20.0	18.9	14.99	17.6	17.7	11.76	17.8	17.0	11.01
Purchasing agents, except wholesale, retail, and farm products	51.2	46.2	26.38	34.0	31.0	15.36	28.5	28.2	12.44	28.0	26.5	11.89
All other managers and administrators	199.2	116.0	4.16	117.2	68.5	2.25	88.6	57.0	1.55	80.9	50.4	1.33
All other management support workers	82.0	66.8	8.59	54.7	44.9	4.43	45.9	40.5	3.32	45.0	37.8	3.02
Professional specialty occupations	646.8	534.9	5.05	420.6	344.9	2.52	357.4	314.6	1.86	354.0	296.4	1.66
Aeronautical and astronautical engineers	36.7	35.2	49.43	14.8	14.1	28.21	11.9	12.1	21.72	11.4	10.9	20.07
Civil engineers, including traffic engineers	24.3	21.3	13.81	16.4	14.6	8.96	14.0	13.2	6.89	13.8	12.4	6.37
Electrical and electronics engineers	95.9	78.4	22.77	51.6	45.2	14.57	43.1	40.8	10.45	42.1	38.1	9.21
Industrial engineers, except safety engineers	25.0	20.1	19.52	11.5	9.5	10.28	9.3	8.5	7.74	9.0	7.9	7.05
Mechanical engineers	44.4	36.8	20.61	26.2	22.2	11.72	20.9	19.2	8.54	19.7	17.4	7.61
Metallurgists and metallurgical, ceramic, and materials engineers	4.5	3.6	24.04	2.9	2.4	15.64	2.2	2.1	11.72	2.1	1.9	10.63
Nuclear engineers	3.7	3.4	24.84	2.5	2.3	18.12	2.1	2.0	14.61	2.0	1.9	13.93
All other engineers	49.9	44.0	21.46	36.7	32.0	11.63	30.3	28.7	8.84	29.3	26.6	8.10
Surveyors	14.1	12.1	15.55	8.7	7.5	9.37	6.9	6.4	7.51	6.5	5.8	7.12
Computer engineers, scientists, and systems analysts	29.0	20.6	8.02	38.9	26.8	4.45	40.0	28.4	2.93	44.8	29.5	2.44
Mathematicians and all other mathematical scientists	2.8	2.6	17.49	1.7	1.7	12.19	1.5	1.5	9.87	1.5	1.4	9.43
Operations research analysts	9.2	8.0	17.95	5.4	4.7	11.12	4.4	4.1	8.71	4.3	3.8	8.15
Physicists and astronomers	5.6	5.1	28.44	3.3	3.1	18.33	2.6	2.7	14.82	2.5	2.4	14.16
All other physical scientists	11.3	10.8	25.03	6.8	6.4	17.10	5.9	5.9	12.75	5.9	5.5	11.53
All other social scientists	8.7	8.5	26.73	6.2	6.0	16.08	5.4	5.6	13.73	5.5	5.3	13.60
Directors, religious activities and education .....	.3	.0	.73	.2	-	.21	.1	-	.14	.1	-	.11
All other professional workers	82.8	73.4	8.80	53.1	46.4	3.86	46.1	43.0	2.94	46.2	40.9	2.70
Technicians and related support occupations	297.6	239.1	8.13	188.9	154.4	4.15	151.3	133.6	2.98	144.1	121.7	2.64
Electrical and electronic technicians and technologists	51.2	38.4	15.40	25.4	20.1	8.58	19.3	16.8	6.01	17.6	14.9	5.21
Drafters	34.6	25.1	11.67	19.0	13.8	6.21	13.1	10.2	4.24	11.3	8.3	3.62
All other engineering technicians and technologists	72.1	62.8	19.42	47.5	41.7	11.97	37.9	36.0	9.18	35.9	32.7	8.47
Science and mathematics technicians	56.2	51.6	23.82	39.5	37.2	17.49	34.2	34.4	14.07	34.2	32.7	13.39
Computer programmers	38.8	26.5	8.09	24.6	16.7	4.48	19.4	13.8	3.15	18.3	12.2	2.75
Programmers, numerical, tool, and process control	1.7	1.4	21.88	.8	.7	12.13	.6	.6	8.78	.6	.5	7.79
Marketing, sales, and service occupations	479.2	222.2	1.81	341.9	158.4	1.04	259.3	135.9	.72	237.9	123.0	.62
Salespersons, retail	30.1	10.1	.86	19.0	6.9	.49	13.7	6.3	.33	12.1	5.9	.28

Table 7. Continued—Defense-related employment by major grouping and selected occupations, 1987, 1996, and projected 2002 and 2006

[Thousands of jobs]

Occupation	1987			1996			2002			2006		
	Defense-related		Defense-related share of total employment (percent)	Defense-related		Defense-related share of total employment (percent)	Defense-related		Defense-related share of total employment (percent)	Defense-related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct		Total	Direct		Total	Direct	
Securities and financial services salesworkers	1.6	0.0	1.06	0.9	—	0.47	0.9	—	0.38	1.0	—	.36
Travel agents	4.3	.1	3.96	3.2	.0	2.63	2.5	.0	1.72	2.3	.0	1.43
All other sales and related workers	124.1	52.5	3.75	90.7	39.7	1.94	66.9	33.0	1.28	60.0	29.3	1.06
Janitors and cleaners, including maids and housekeepers	83.8	43.4	3.28	53.3	26.4	1.78	39.4	20.9	1.29	35.4	18.0	1.15
Hairdressers, hairstylists, and cosmetologists .....	.1	.0	.05	.2	.0	.06	.1	.0	.03	0.1	.0	.02
Guards	47.8	28.6	6.60	33.3	18.9	3.49	26.4	15.7	2.45	24.9	13.9	2.12
Administrative support occupations, including clerical	934.5	608.2	4.44	588.0	395.5	2.50	454.9	339.0	1.85	423.0	306.5	1.67
All other communications equipment operators	1.9	1.7	11.87	1.2	1.2	13.86	1.1	1.1	15.43	1.1	1.1	18.24
Procurement clerks	10.5	9.5	25.25	6.7	6.1	11.83	5.7	5.6	10.15	5.6	5.3	10.08
Production, planning, and expediting clerks	34.8	27.0	15.85	19.3	15.2	8.12	14.6	12.6	5.91	13.3	11.2	5.26
Stock clerks	72.5	52.1	3.88	44.4	33.2	2.41	35.4	29.9	1.89	33.5	27.8	1.77
Bookkeeping, accounting, and auditing clerks	95.2	62.7	4.82	58.5	41.1	2.90	45.2	35.7	2.31	41.8	32.5	2.18
Personnel clerks, except payroll and timekeeping	21.7	19.8	17.24	15.0	13.9	12.08	12.9	12.8	10.29	12.8	12.2	10.18
Secretaries, except legal and medical	155.8	110.5	5.70	88.2	65.5	3.13	67.7	55.4	2.45	62.5	49.5	2.29
Typists and word processors	32.9	19.4	3.57	13.2	7.4	2.08	8.6	5.0	1.50	7.1	3.9	1.33
Bank tellers	7.2	.0	1.38	3.5	.0	.65	2.9	.0	.52	2.7	.0	.50
Clerical supervisors and managers	53.3	34.9	4.63	36.2	24.9	2.65	29.4	22.2	1.94	28.2	20.5	1.73
Loan interviewers .....	.3	.0	1.37	.1	.0	.65	.1	.0	.52	.1	.0	.50
General office clerks	99.6	63.1	4.12	68.4	44.2	2.21	50.8	36.5	1.58	45.9	32.2	1.39
All other clerical and administrative support workers	105.2	75.6	6.65	73.9	55.3	3.98	59.6	49.1	2.98	56.8	45.4	2.71
Agriculture, forestry, fishing, and related occupations	31.3	6.0	1.44	18.7	4.1	.83	14.3	3.6	.61	13.1	3.4	.55
Animal caretakers, except farm	1.9	1.1	2.63	.9	.5	.99	.8	.4	.69	.7	.4	.60
Precision production, craft, and repair occupations	851.1	613.1	7.03	505.5	379.8	3.94	389.2	324.6	2.91	361.6	293.4	2.63
Blue-collar worker supervisors	118.8	80.2	7.26	67.2	47.2	3.93	50.6	40.0	2.92	46.1	35.8	2.63
Electronics repairers, commercial and industrial equipment	24.0	22.7	36.33	16.9	16.2	31.73	14.8	15.2	25.83	14.9	14.5	24.78
All other electrical and electronic equipment mechanics, installers, and repairers	9.1	8.0	21.06	5.9	5.3	13.77	4.9	4.7	10.69	4.8	4.4	9.94
Industrial machinery mechanics	30.3	17.6	6.84	18.2	11.4	4.09	13.6	9.7	2.95	12.3	8.7	2.61
Maintenance repairers, general utility	42.1	24.6	4.21	29.4	17.7	2.23	22.8	15.4	1.56	21.2	14.0	1.35
Aircraft engine specialists	8.3	7.9	50.66	6.1	5.9	26.26	5.2	5.4	21.49	5.2	5.0	20.69
Aircraft mechanics	33.5	31.1	33.61	22.1	20.6	19.93	18.7	18.7	15.55	18.3	17.5	14.50
Mobile heavy equipment mechanics	17.0	15.0	17.35	11.7	10.6	11.78	10.1	10.0	9.80	10.1	9.5	9.54
Precision instrument repairers	5.5	4.0	12.20	3.4	2.6	8.75	2.6	2.3	6.87	2.4	2.0	6.44
Riggers	4.7	4.4	33.03	2.8	2.7	29.98	2.3	2.4	28.10	2.2	2.2	29.61

Table 7. Continued—Defense-related employment by major grouping and selected occupations, 1987, 1996, and projected 2002 and 2006

[Thousands of jobs]

Occupation	1987			1996			2002			2006		
	Defense-related		Defense-related share of total employment (percent)	Defense-related		Defense-related share of total employment (percent)	Defense-related		Defense-related share of total employment (percent)	Defense-related		Defense-related share of total employment (percent)
	Total	Direct		Total	Direct		Total	Direct		Total	Direct	
Aircraft assemblers, precision	16.9	16.3	55.47	10.2	9.9	41.38	8.2	8.5	31.59	7.9	7.7	29.04
Electrical and electronic equipment assemblers, precision	30.6	21.0	19.51	16.2	11.2	8.33	9.7	7.4	5.01	7.6	5.6	3.93
All other precision assemblers	7.7	6.0	23.49	4.2	3.3	11.03	2.9	2.4	7.17	2.4	2.0	5.92
Inspectors, testers, and graders, precision	77.4	53.3	11.80	37.8	26.1	6.00	25.5	19.5	4.14	21.5	16.1	3.56
Machinists	52.9	36.6	13.72	30.1	21.7	7.90	21.5	17.7	5.67	19.0	15.4	5.01
Shipfitters	6.4	6.4	47.63	4.1	4.1	43.66	3.3	3.5	35.60	3.2	3.2	34.18
Operators, fabricators, and laborers	880.5	491.2	5.55	517.0	288.8	3.01	370.5	231.8	2.05	328.7	201.5	1.76
Numeric control machine tool operators and tenders, metals and plastics	14.0	11.2	22.07	8.7	6.5	9.41	6.8	5.7	6.37	6.3	5.2	5.41
Electrolytic plating machine operators and tenders, setters, and set-up operators, metals and plastics	7.2	3.3	17.07	3.7	1.5	8.91	2.5	1.2	5.62	2.1	1.1	4.55
Electronic semiconductor processors	7.1	4.5	19.06	5.2	3.2	8.87	3.0	2.0	4.84	2.3	1.5	3.56
Coil winders, tapers, and finishers	4.1	2.6	18.55	1.9	1.2	8.76	1.0	.7	4.80	.7	.5	3.54
All other machine operators, tenders, setters, and setup operators	33.0	16.1	6.72	18.4	8.0	3.12	12.3	5.8	1.98	10.4	4.7	1.61
Electrical and electronic assemblers	42.1	27.5	18.16	19.8	13.0	8.64	11.3	8.0	4.95	8.5	5.8	3.76
Welders and cutters	30.8	22.4	10.52	19.2	14.3	5.89	14.7	12.1	4.27	13.5	10.8	3.79
All other assemblers and fabricators	98.1	61.2	9.20	53.7	32.3	4.29	34.5	23.0	2.78	28.2	18.3	2.29
Truck drivers, light and heavy	83.3	38.8	4.01	58.5	28.6	2.41	42.9	23.2	1.62	38.4	20.2	1.37
All other motor vehicle operators	8.3	7.7	19.27	5.5	5.3	20.57	4.9	5.0	17.83	4.9	4.8	17.84
Able seamen, ordinary seamen, and marine oilers	2.8	2.6	12.64	1.9	1.8	9.23	1.6	1.6	8.10	1.6	1.5	8.16
Ship engineers	1.1	1.0	16.04	.8	.7	10.33	.7	.7	9.28	.6	.6	9.52
Freight, stock, and material movers, hand	31.9	14.3	3.88	19.4	8.7	2.45	13.3	6.6	1.63	11.4	5.5	1.37
All other helpers, laborers, and material movers, hand	103.2	67.1	5.87	60.9	40.5	3.56	49.0	35.9	2.62	46.7	33.2	2.35

to prime contractors travel across State borders through subcontracting. To adapt to the current fiscal climate, employers in both the public and private sectors are streamlining operations, merging business activities, utilizing the transferable skills of an established highly trained labor force, and diversifying activities into nondefense-related commercial projects.

The aerospace industry, for example, is making a successful transition from meeting the demand of defense-dependent markets to meeting that of nondefense markets.¹² From 1986 to 1996, the industry experienced a decline of 305,000 jobs, or a 4.3-percent annual decline in employment. While em-

ployment in the defense-related segment of the aerospace industry is projected to decrease by 54,600 jobs between 1996 and 2006, overall employment in the industry is expected to grow by 46,000 jobs during the same period. The projected growth in employment is attributed to additional freight traffic and growing consumer demand for airline travel, resulting in increased orders for commercial aircraft.

Occupations

The reduction in defense expenditures is expected to have an

Table 8. Occupations most heavily dependent on defense spending, 1996

[Percent of total employment]

Occupation	Defense-related share of employment
Shipfitters	43.7
Aircraft assemblers, precision	41.4
Electronics repairers, commercial and industrial equipment	31.7
Riggers	30.0
Aeronautical and astronautical engineers	28.2
Aircraft engine specialists	26.3
All other motor vehicle operators	20.6
Aircraft mechanics	19.9
Physicists and astronomers	18.3
Nuclear engineers	18.1
Science and mathematics technicians	17.5
All other physical scientists	17.1
Budget analysts	16.9
All other social scientists	16.1
Metallurgists and metal, ceramic, and materials engineers	15.6
Purchasing agents, except wholesale, retail, and farm products	15.4
Management analysts	15.0

impact on every major occupational group. (See table 6.) The most notable decreases in employment over the 1987–2006 period are among occupational groups having the largest number of workers tied to defense spending. (See table 7.) These groups include operators, fabricators, and laborers (–551,802 jobs); administrative support, including clerical (–511,532 jobs); and precision production, craft, and repair occupations (–489,458 jobs). (See table 6.) The reductions are also changing the occupational composition of defense-related employment. By 2006, professional specialty occupations will outnumber operators, fabricators, and laborers, to become the third largest occupational group associated with defense-related employment.

Table 8 identifies the occupations most heavily dependent on defense spending in 1996, which range from positions requiring little formal education to years of graduate school. Occupations projected to experience the greatest change in employment are detailed in table 9. The occupations with the largest declines also tend to require years of specialized on-the-job training, or lower levels of formal education, or both. Due to advances in technology, changes in production meth-

Table 9. Occupations with the largest level changes in defense-related employment, 1987–1996 and projected 1996–2002, 1996–2006, and 1987–2006

[Thousands of jobs]

Occupation	1987–1996	1996–2002	1996–2006	1987–2006
All other managers and administrators	–82.0	–28.6	–36.3	–118.3
Secretaries, except legal and medical	–67.6	–20.5	–25.7	–93.3
Blue-collar worker supervisors	–51.6	–16.6	–21.1	–72.7
All other assemblers and fabricators	–44.4	–19.2	–25.5	–69.9
All other sales and related workers	–33.4	–23.8	–30.7	–64.1
All other helpers, laborers, and material movers, hand	–42.3	–11.9	–14.2	–56.5
Inspectors, testers, and graders, precision	–39.6	–12.3	–16.3	–55.9
Electrical and electronics engineers	–44.3	–8.5	–9.5	–53.8
General office clerks	–31.2	–17.6	–22.5	–53.7
Bookkeeping, accounting, and auditing clerks	–36.7	–13.3	–16.7	–53.4
Janitors and cleaners, including maids and housekeepers	–30.5	–13.9	–17.9	–48.4
All other clerical and administrative support workers	–31.3	–14.3	–17.0	–48.3
Truck drivers, light and heavy	–24.8	–15.6	–20.1	–44.9
Stock clerks	–28.1	–9.0	–10.8	–39.0
All other management support workers	–27.3	–8.8	–9.7	–37.0
All other professional workers	–29.7	–7.0	–6.9	–36.7
All other engineering technicians and technologists	–24.6	–9.6	–11.7	–36.3
Machinists	–22.8	–8.6	–11.1	–34.0
Electrical and electronic assemblers	–22.3	–8.5	–11.3	–33.6
Electrical and electronic technicians and technologists	–25.8	–6.1	–7.7	–33.5
Accountants and auditors	–21.3	–7.7	–9.0	–30.2
Typists and word processors	–19.7	–4.6	–6.1	–25.8
Aeronautical and astronautical engineers	–21.9	–2.9	–3.5	–25.4
Clerical supervisors and managers	–17.1	–6.8	–8.0	–25.1
Mechanical engineers	–18.2	–5.3	–6.5	–24.7
Drafters	–15.6	–5.9	–7.7	–23.3
Purchasing agents, except wholesale, retail, and farm products	–17.2	–5.5	–6.0	–23.3
Electrical and electronic equipment assemblers, precision	–14.4	–6.5	–8.6	–23.0

Table 9. Continued—Occupations with the largest level changes in defense-related employment, 1987–1996 and projected 1996–2002, 1996–2006, and 1987–2006

[Thousands of jobs]

Occupation	1987–1996	1996–2002	1996–2006	1987–2006
Guards	-14.5	-6.9	-8.3	-22.8
All other machine operators, tenders, setters, and setup operators	-14.6	-6.1	-8.0	-22.7
Science and mathematics technicians	-16.7	-5.3	-5.3	-22.0
Production, planning, and expediting clerks	-15.5	-4.7	-6.0	-21.5
Maintenance repairers, general utility	-12.7	-6.6	-8.2	-20.9
All other engineers	-13.2	-6.4	-7.5	-20.6
Computer programmers	-14.2	-5.2	-6.3	-20.5
Freight, stock, and material movers, hand	-12.5	-6.1	-7.9	-20.4
Salespersons, retail	-11.1	-5.3	-6.9	-18.0
Industrial machinery mechanics	-12.1	-4.6	-5.9	-17.9
Welders and cutters	-11.6	-4.5	-5.7	-17.3
Computer engineers, scientists, and systems analysts	9.9	1.1	5.9	15.8

Table 10. Occupations with the greatest amount of indirect defense-related employment in 1996

[Thousands of jobs]

Occupation	Indirect employment	Occupation	Indirect employment
All other sales and related workers	51.1	Machinists	8.3
All other managers and administrators	48.7	Computer programmers	7.9
Truck drivers, light and heavy	29.9	Receptionists and information clerks	7.8
Janitors and cleaners, including maids and housekeepers	26.9	Financial managers	7.5
General office clerks	24.2	Food counter, fountain, and related workers	7.5
Secretaries, except legal and medical	22.7	Industrial truck and tractor operators	7.0
All other assemblers and fabricators	21.4	Electrical and electronic assemblers	6.9
All other helpers, laborers, and material movers, hand	20.4	Industrial machinery mechanics	6.8
Blue-collar worker supervisors	20.0	All other professional workers	6.7
All other clerical and administrative support workers ..	18.6	All other service workers	6.5
Bookkeeping, accounting, and auditing clerks	17.5	Printing, binding, and related workers	6.5
Guards	14.4	Electrical and electronics engineers	6.4
Accountants and auditors	12.4	All other handworkers	6.0
Computer engineers, scientists, and systems analysts	12.1	Marketing, advertising, and public relations managers	5.8
Salespersons, retail	12.1	All other engineering technicians and technologists ...	5.8
Maintenance repairers, general utility	11.7	Typists and word processors	5.8
Inspectors, testers, and graders, precision	11.7	All other machine tool cutters and formers	5.6
Cashiers	11.5	All other agricultural, forestry, fishery, and related workers	5.5
Hand packers and packagers	11.4	Data entry keyers, except composing	5.4
Clerical supervisors and managers	11.3	Electrical and electronic technicians and technologists	5.2
Stock clerks	11.1	Drafters	5.1
Freight, stock, and material movers, hand	10.7	Electrical and electronic equipment assemblers, precision	5.0
All other machinery operators, tenders, setters, and setup operators	10.4	Teachers, preschool through college, except special and adult education	4.9
All other management support workers	9.8	Welders and cutters	4.9
Waiters and waitresses	9.7	All other engineers	4.7

ods, and an overall decline in manufacturing employment, operators, fabricators, and laborers and precision production, craft, and repair occupations are projected to generate only slow growth in employment over the 1996–2006 projection period.¹³ Consequently, workers displaced from defense-related jobs may have difficulty finding alternative nondefense employment. Some firms that diversify their core businesses into nondefense-related enterprises, however, may offer dis-

placed workers employment-counseling services and opportunities to acquire additional education or retraining.

Defense-related employment has long been an integral part of many communities. Spending on defense creates a wide variety of employment opportunities for unskilled workers as well as Ph.D.'s across a broad range of business establishments. Therefore, the impact of decreased defense dollars will continue to be felt across occupations indirectly related to de-

fense spending. Table 10 shows occupations with the largest amount of indirect defense-related employment in 1996. Many of these occupations—all other managers and administrators, all other sales and related workers, truckdrivers, janitors, secretaries, and retail salespersons—also are among the occupations listed in table 9 with the largest changes in defense-related employment. There are few occupations completely immune to the economic impact of declining defense dollars.

IN SUMMARY, THE DECADE-LONG CONTRACTION in defense-related expenditures and employment is projected to continue, at a slower rate, through 2006. Almost three-quarters of the expected reductions in defense-related employment between 1987 and 2006 have transpired. The reductions are projected

to have an impact on employment across a myriad of industries and occupations directly and indirectly related to defense. Such industries and occupations range from weapon design, development, and production to those supplying support, technical expertise, and transportation services to the Government and private firms. The fierce competition for limited defense dollars, particularly among industries with significant concentrations of defense employment, is likely to remain throughout the projected period. To stay competitive, many firms will continue to redesign their operations and products, and enter nondefense markets. Over the next decade, the repercussions of fewer defense dollars, while still substantial, show signs of easing, as industries adjust and worker retraining initiatives are implemented. □

Footnotes

¹ All data for this article are on a calendar-year basis.

² This article is part of a continuing series from the Bureau of Labor Statistics, Office of Employment Projections: *U.S. Defense Related Employment Retrenches, Issues in Labor Statistics*, May 1995; and Norman Saunders, "Employment effects of the rise and fall of defense spending," *Monthly Labor Review*, April 1993, pp. 3–10.

³ Employment generated by defense spending can be divided into two categories—direct and indirect. Nearly all industries have some combination of direct and indirect defense-related employment. Direct defense-related employment evolves from the Defense Department's spending on all final goods and services. Indirect defense-related employment arises from the need to supply inputs to the producers of these final goods and services.

⁴ These estimates were derived from the 1996–2006 BLS projections in *Monthly Labor Review*, November 1997, various articles.

⁵ *Ibid.* Also, see first paragraph of the appendix.

⁶ A decline in job requirements does not necessarily result in fewer jobs in the economy or a rise in unemployment; other factors of demand, such as exports, investment, and personal consumption, could offset this decline.

⁷ These estimates were derived from the 1996–2006 BLS projections in *Monthly Labor Review*, November 1997, various articles.

⁸ The income multiplier effect—changes in defense spending directly and indirectly—has an impact on defense-related employment. These changes in defense-related employment produce shifts in consumption and invest-

ment patterns, which may alter employment in industries unrelated to defense spending. These tertiary effects are referred to as income effects and are not estimated in this study. Similarly, the effects from the lost reinvestment of profits and the decreased investment requirements resulting from reduced production needs are not examined.

⁹ *Paying for Military Readiness and Upkeep: Trends in Operation and Maintenance Spending* (Washington, Congressional Budget Office, September 1997).

¹⁰ Additional information regarding Base Realignment and Closures is found in William S. Cohen, *Report of the Quadrennial Defense Review* (Department of Defense, May 1997); William S. Cohen, *Defense Reform Initiative Report* (Department of Defense, November 1997); and *Transforming Defense: National Security in the 21st Century* (Report of the National Defense Panel, December 1997).

¹¹ *The Costs and Benefits of Retail Activities at Military Bases* (Washington, Congressional Budget Office, October 1997).

¹² For additional information on defense-dependent industries, including aerospace, see Ron Hetrick, "Employment in high-tech defense industries in a post cold war era," *Monthly Labor Review*, August 1996, pp. 57–63.

¹³ Additional detail of the Bureau of Labor Statistics Employment Projections 1996–2006 can be found on the Bureau's Web Page, <http://stats.bls.gov> and in the *Monthly Labor Review*, November 1997. Also, see *BLS Releases New 1996–2006 Employment Projections* (Bureau of Labor Statistics, Dec. 3, 1997).

Appendix: Data Sources and Methodology

Defense spending and defense-related employment are derived using the Department of Defense proposed budget outlays, the Bureau of Economic Analysis National Income and Product Accounts data, and BLS input-output tables. Historical data on Government expenditures are published annually in *The Survey of Current Business* (tables 3.7b, 3.8b, 3.10 and 3.11). Expenditures are separated into three groups—Federal Government defense, Federal Government nondefense, and State and local government. Additional levels of detail are provided for each of the three categories. Projected outlays through 2002 are published in the Department of Defense's *National Defense Budget Estimates for FY 1998*. The projected expenditure data are converted to National Income and Product Accounts concepts by applying the average ratio between National Income and Product Accounts and Defense Department series

computed over the past 10 years. The current National Income and Product Accounts data are then deflated with the projected defense spending deflators, derived from the implicit price deflators projections section of the Data Resources, Inc., *Comprehensive Quarterly Model of the U.S. Economy*.

The input-output table and associated requirements tables are part of the data system used by the Bureau of Labor Statistics to prepare its regular biannual projections of the U.S. economy at an industry level of detail. The input-output table is published every 5 years and consists of two tables—the "make" and the "use tables." The make table indicates the commodities an industry makes, including primary and secondary products, while the use table indicates the inputs used by an industry in producing those commodities. The use table also offers information regarding the technology

used in production, purchases of commodities by end users, and the value added to production in each industry. The use table acts as a bridge between the National Income and Product Accounts data on Government defense expenditures and the industries producing these goods and services.

A "total requirements" table is derived from the make and use tables to convert the production concepts in the input-output table to employment. The total requirements table indicates the total production required to support \$1 of final demand. It includes both the direct and indirect input requirements to production. The total requirements table is scaled to the employment-output ratio for each industry, thus converting the production required per dollar of demand to the employment required per dollar of demand. The end result is the employment requirements table. The employment requirements table shows how the interrelationships between various

industries affect employment. For example, defense spending generates employment in the aerospace industry, which generates employment in the electronic components and accessories industry and the communication equipment industry. Employment is indirectly affected in the retail trade industry, and the hotels and other lodging industry, because communities develop around manufacturing sites and travelers seek overnight accommodations to conduct business. This analysis does not examine job creation or reduction associated with the income multiplier effect of defense spending.

Industry employment is translated to occupational employment, using the industry-occupation matrix. The matrix details the occupational content of each industry and is projected to 2006 as part of the BLS ongoing projections program. Defense-related industry employment is multiplied by these staffing patterns to generate the occupational employment statistics related to defense spending.

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