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Defense Cuts

What Might Connecticut Expect on the Manufacturing Employment Front?

Bruce D. Wundt

Connecticut has enjoyed considerable economic prosperity as a result of its reliance on the defense industry. However, as a consequence of reductions in federal spending on defense, this favorable trend of many years is reversing, unfortunately, while the region is also experiencing a general economic slowdown. Many Connecticut industries must prepare for a new era of reducing their dependence on defense contracts and diversify into new markets and products. State policymakers can help during these uncertain times by encouraging private and public retraining of labor resources and the expansion of industries that will promote economic stability.

Connecticut has enjoyed economic prosperity as a result of increased federal spending on defense that began in the late 1970s and continued through the 1980s. Residents of the state were regularly apprised of the contracts awarded to such major players as Pratt & Whitney and Sikorsky, both divisions of United Technologies, and the Electric Boat Division of General Dynamics. We were also regularly reminded of our favorable unemployment and income levels relative to other states. Most would agree that this prosperity was closely linked with the high level of defense spending per capita the state experienced at the time. This recognition has been underscored of late because the trend is reversing. While the full extent of defense reductions is not yet known, we can be certain that they will have an impact on both the composition and the level of defense spending in the state. We have already been informed of recent employment cutbacks at many of the companies whose primary production is geared to defense. The employment situation is further exacerbated by a general slowdown in economic activity.¹

The Defense Industry in Connecticut

Two state industries closely related to the defense industry are aircraft and aircraft parts (which includes Pratt & Whitney and Sikorsky) and ship and boat building (which includes Electric Boat).² Direct employment in these defense-related industries has

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averaged greater than 21 percent of the total manufacturing base of employment in Connecticut during the twenty-three years between 1964 and 1987. These employees represent roughly 86,000 workers of a manufacturing base that averaged 400,000 during this period. The majority of such employment (76 percent, or 65,360 employees) belongs to the aircraft and parts category, by far the largest single manufacturing industry in the state. In contrast, national employment in these two industries represents only about 4.2 percent of total U.S. manufacturing employment. In addition, while Connecticut's manufacturing base relative to national manufacturing is only about 2.25 percent, the share of the state's employment in aircraft and ship production compared to employment in these industries at the national level is greater than 11 percent. From 1964 to 1987, manufacturing employment in Connecticut declined at a rate of one half of one percent per year, but the share of employment in aircraft and ship production actually grew, especially from 1977 forward. This corresponds directly with increases in federal military spending that began prior to the Reagan years.

Given the size of Connecticut's manufacturing base, an average of 86,000 employees directly engaged in aircraft and ship production is impressive in itself. However, when we consider that many manufacturing sectors supply various parts and services in support of these industries, we gain an even greater sense of their significance to the state. Keep this in mind as we address several related questions. First, how can we identify those industries with specific production linkages to aircraft and ship production, and how has this dependence affected their employment behavior? Second, how do changes in employment in these two major industries affect overall manufacturing employment and defense-dependent employment? And third, given the reality of defense cutbacks, what can be done to mitigate the employment reductions the state has already begun to experience?

Production Linkages with Defense Industries

There are varied estimates of the impact that defense spending reductions will have on the state's manufacturing employment.³ One reason is the difficulty in measuring the complex linkages of industries related to defense production. An accurate estimation should take into account not only the direct impact on the aircraft and ship-building industries, but also the indirect impact on the many other manufacturing industries in the state.

One way to identify the industries with production linkages is to trace the portion of one industry's output (the indirect industry) that is used by another (the direct industry) as a production input.⁴ This approach enables us to identify the production interrelationship between each manufacturing industry and the aircraft (or ship-building) industry and provides an estimate of the degree of this association. For this purpose, the manufacturing sector was disaggregated into eighty-one relatively detailed industries. Significant linkages are found to exist between at least twenty-five industries and aircraft and ship production. (A description of all industries is provided in Appendix A.) For example, industries engaged in the electric and electronic equipment, engineering and scientific instruments, primary metal, and metal machinery sectors have strong ties to aircraft and ship production. In dollar terms, for every one-dollar increase in the demand for output from the aircraft and parts industry, a multiplier effect leads to an increase in output from all industries (both aircraft and parts and production-related) of roughly \$1.52; for every dollar increase

in the demand for output from ship and boat building, there is an increase in output from all industries of roughly \$1.75. (The impact that these industries have on twenty-five of the state's manufacturing industries is shown in Appendix B.)

Several interesting points emerge once the interindustry relationships are identified. Those industries with the greatest degree of production dependence on aircraft and ship production also tend to be large employers, corroborating that the state's manufacturing base has specialized to serve these major industries. But what is also revealed is an inverse relationship between relative employment stability and the aircraft and shipbuilding industries.⁵ This is a significant finding because it suggests that many industries have experienced greater employment stability as a consequence of their dependence on aircraft and ship production resulting from the defense buildup. The stabilizing effect is also reflected in the behavior of overall manufacturing employment. While manufacturing employment exhibited a downward trend over the entire 1964–1987 interval, in times of increased federal defense expenditures — particularly from 1977 on — manufacturing employment fluctuations were relatively mild. This is in contrast to the ten years prior to 1977, when defense expenditures began to decline and we experienced greater instability in manufacturing employment.

Next, what impact do the aircraft and shipbuilding industries have on overall manufacturing? Historical evidence suggests that for every one percent change in employment in these two industries, there is roughly a four tenths to one half of one percent change in overall manufacturing employment in the same direction. The relationship is remarkably stable during periods of both expansion and contraction. For example, if we estimate combined employment in the two defense-related industries to drop by 5 percent (based on 1987 employment of 85,550, this would represent a reduction of approximately 4,280 workers), the impact on total manufacturing employment (based on 1987 employment of 359,203) would be on the order of 7,500 to 9,500 workers. The impact on manufacturing employment net of aircraft and shipbuilding is between 3,200 and 5,200 workers. The range is an estimate of how employment in the production-related industries would be affected. Based on such figures, a reasonable estimate of the number of manufacturing employees directly and indirectly related to these two sectors of the defense industry is slightly greater than one in four workers. The ratio also suggests that the state's overall unemployment rate could increase by slightly more than one half of one percent as a result of the initial 5 percent reduction. It should be emphasized that, given the relative magnitudes of these two industries in the state, the aircraft and parts industry is responsible for the majority of the employment impacts described.

What can be concluded from these figures and, with future cutbacks in defense spending, what do they suggest for the future of Connecticut's manufacturing economy? Because the state's current economic structure relies on the production of aircraft and aircraft parts, there is no doubt that reductions in employment in this industry will translate into reductions in employment in many other industries. Such a trend has already begun. Should the ship- and boat-building industry shrink, however, the consequences for the state won't be as severe.

As the major employer in the aircraft and parts industry, Pratt & Whitney has already been successful in increasing its commercial sales relative to its military business. This favorable reallocation should continue as global markets continue to

expand. While the new era in East-West relations may mean a reduction in military demand, it should also present the opportunity for increased commercial business. So too will changes under way in the European Economic Community. Similarly, while there will also be a reduction in the military's demand for helicopters, it does not follow that opportunities for expanding into other markets do not exist.⁶

Connecticut should not direct its efforts toward replacing the defense industry with another dominant industry. Regional economists are well aware that all industries eventually experience changes in market trends, a natural occurrence in industrial economies. The state has been fortunate for the last thirteen years, but the economy must now diversify. As markets guide it, the state must encourage the expansion of industries that would not only increase the manufacturing base, but also provide stability in employment. To attain this objective, state policymakers should focus their efforts on promoting the expansion of industries compatible with the state's economic structure. Preliminary research suggests that certain medical instruments, printing, chemical, and textile and apparel industries may fit this objective.⁷ This topic should be studied in greater depth.

While public and private retraining of displaced workers is important, we must be mindful that retraining does not guarantee employment, especially since the timing of defense cutbacks will coincide with a general economic slowdown. However, the high skill level of the affected labor force should augur a considerable degree of transference of labor resources to other industries. Engineers, computer specialists, mechanics and others in specialized trades can be employed in the manufacture of nondefense goods. To that end, greater emphasis should be placed on the occupation than on the industry.⁸

The gradual reduction of defense expenditures can provide a buffer as Connecticut firms respond to the conversion process. Companies will have to diversify across products and markets. This change may be more difficult for those engaged in supplying such defense-dependent products as submarines and tank engines and, to a lesser degree, helicopters. In addition to expanding current markets, planners must find new uses for existing technologies to facilitate the production of nondefense goods. While this conversion process may be painful for a time, Connecticut firms have few options; they must therefore respond to changing market conditions. ■

This article is based on an update of recent research and a presentation made at a conference entitled "The Impact of Defense Cutbacks on the Connecticut Economy," sponsored by the Economic Club of Connecticut, June 1990. I would like to thank Dominick T. Armentano, John P. Speir, and Jude Thibodeau for their useful comments and suggestions.

Appendix A

Eighty-one Manufacturing Industries

A: Twenty-five Industries with Greatest Production Linkages to the Aircraft and Aircraft Parts Industry

SIC Code	Description
1. 366	Communications equipment
2. 367	Electronic components and accessories
3. 346	Metal forgings and stampings
4. 335	Nonferrous rolling and drawing
5. 354	Metalworking machinery
6. 30	Rubber and plastics
7. 331	Blast furnace and basic steel products
8. 3599	Other machinery: engines and turbines (351), farm and garden machinery (352), construction and related machinery (353), special industry machinery (355), refrigeration and service machinery (358), miscellaneous machinery, except electrical (359)
9. 356	General industrial machinery
10. 345	Screw machine products, bolts, etc.
11. 3399	Other primary metal industries: iron and steel foundries (332), secondary nonferrous metals (334), miscellaneous primary metal products (339)
12. 336	Nonferrous foundries
13. 382	Measuring and controlling devices
14. 3899	Other instruments and related products: optical instruments and lenses (383), ophthalmic goods (385), photographic equipment and supplies (386)
15. 342	Cutlery, hand tools, and hardware
16. 347	Metal services
17. 3499	Other fabricated metal products: metal cans and shipping containers (341), plumbing and heating, except electric (343), miscellaneous fabricated metal (349)
18. 2899	Other chemical products: industrial inorganic chemicals (281), drugs (283), industrial organic chemicals (286), agricultural chemicals (287)
19. 329	Miscellaneous nonmetallic mineral products
20. 369	Miscellaneous electrical equipment and supplies
21. 381	Engineering and scientific instruments
22. 362	Electrical industrial apparatus
23. 282	Plastics materials and synthetics
24. 344	Fabricated structural metal products
25. 289	Miscellaneous chemical products

B: Remaining Manufacturing Industries

26. 202	Dairy products
27. 203	Preserved fruits and vegetables
28. 205	Bakery products
29. 208	Beverages
30. 2099	Other food and kindred: meat products (201), grain mill products (204), sugar and confectionery (206), fats and oils (207), miscellaneous foods and kindred products (209)
31. 21	Tobacco: cigarettes (211), cigars (212), tobacco stemming and redrying (214)
32. 222	Weaving mills, synthetics
33. 225	Knitting mills
34. 228	Yarn and thread mills
35. 229	Miscellaneous textile goods
36. 2299	Other textile products: weaving mills, cotton (221), weaving and finishing mills, wool (223), narrow fabric mills (224), textile finishing, except wool (226), floor covering mills (227)
37. 232	Men's and boys' furnishings
38. 233	Women's and misses' outerwear

SIC Code	Description
39. 234	Women's and children's undergarments
40. 238	Miscellaneous apparel and accessories
41. 239	Miscellaneous fabricated textile products
42. 2399	Other apparel products: men's and boys' suits and coats (231), hats, caps, and millinery (235), children's outerwear (236), fur goods (237)
43. 243	Millwork, plywood, and structural members
44. 244	Wood containers
45. 249	Miscellaneous wood products
46. 2499	Other wood: logging camps and contractors (241), sawmills and planing mills (242), wood buildings and mobile homes (245)
47. 251	Household furniture
48. 259	Miscellaneous furniture and fixtures
49. 2599	Other furniture: office furniture (252), public building and related furniture (253), partitions and fixtures (254)
50. 264	Converted paper products
51. 265	Paperboard containers and boxes
52. 2699	Other paper products: paper mills, except building paper (262), paperboard mills (263), building paper and board mills (266), pulp mills (261)
53. 271	Newspapers
54. 272	Periodicals
55. 273	Books
56. 275	Commercial printing
57. 276	Manifold business forms
58. 278	Blankbooks and bookbinding
59. 279	Printing trade services
60. 2799	Other printing and publishing: miscellaneous publishing (274), greeting card publishing (277)
61. 284	Soap, cleaners, toilet goods
62. 285	Paints and allied products
63. 31	Leather and leather products
64. 323	Products of purchased glass
65. 327	Concrete, gypsum, plaster products
66. 3299	Other stone, clay, and glass: glass and glassware, pressed or blown (322), structural clay products (325), pottery (326)
67. 348	Ordnance and accessories, not elsewhere classified
68. 357	Office and computing machines
69. 361	Electric distributing equipment
70. 363	Household appliances
71. 364	Electric lighting and wiring equipment
72. 367	Electronic components and accessories
73. 372	Aircraft and parts
74. 373	Miscellaneous transportation equipment: motor vehicle and equipment (371), ship- and boat building and repairing (373), motorcycles, bicycles, and parts (375), miscellaneous transportation equipment (379)
75. 384	Medical instruments and supplies
76. 387	Watches, clocks, and watchcases
77. 391	Jewelry, silverware, and plated ware
78. 393	Musical instruments
79. 394	Toys and sporting goods
80. 396	Costume jewelry and notions
81. 3999	Miscellaneous manufacturers: miscellaneous manufacturers (399), pens, pencils (395), office and art supplies

Sources: Executive Office of the President, Office of Management and Budget, Statistical Policy Division, *SIC Manual, 1972*, and *Survey of Current Business, 1972*.

Appendix B

**Twenty-five Industries with Greatest Production Linkages to the Aircraft
and Ship-building Industries***

(1)	(2)	Aircraft and Parts		Ship and Boat Building	
		(3)	(4)	(5)	(6)
	SIC	Total Requirements Coefficient	Total Requirements Coefficient (Employment)	Total Requirements Coefficient	Total Requirements Coefficient (Employment)
1.	366	0.0422	0.0738	0.0738	0.0061
2.	367	0.0371	0.0588	0.0588	0.0066
3.	346	0.0339	0.4555	0.0455	0.0700
4.	335	0.0323	0.0221	0.0221	0.0103
5.	354	0.0164	0.0231	0.0231	0.0067
6.	30	0.0124	0.0171	0.0171	0.0483
7.	331	0.0115	0.0067	0.0067	0.0142
8.	3599	0.0109	0.0135	0.0135	0.0212
9.	356	0.0106	0.0133	0.0133	0.0113
10.	345	0.0105	0.0148	0.0148	0.0123
11.	3399	0.0092	0.0079	0.0079	0.0086
12.	336	0.0087	0.0105	0.0105	0.0054
13.	382	0.0079	0.0109	0.0109	0.0016
14.	3899	0.0069	0.0031	0.0031	0.0002
15.	342	0.0057	0.0026	0.0026	0.0039
16.	347	0.0043	0.0082	0.0082	0.0066
17.	3499	0.0041	0.0061	0.0061	0.0135
18.	2899	0.0040	0.0019	0.0019	0.0024
19.	329	0.0032	0.0084	0.0084	0.0104
20.	369	0.0032	0.0023	0.0023	0.0076
21.	381	0.0031	0.0035	0.0035	0.0002
22.	362	0.0023	0.0021	0.0021	0.0022
23.	282	0.0017	0.0005	0.0005	0.0010
24.	344	0.0015	0.0021	0.0021	0.0025
25.	289	0.0013	0.0008	0.0008	0.0012
Total of 81 Industries		1.5181	1.5956	1.7462	1.6207

* Note: Columns (3) and (5) are total requirement coefficients for industries listed in column (2) corresponding to a \$1.00 increase in demand for output from the aircraft and parts and ship- and boat-building industries, respectively. For example, the coefficient of 0.0422 suggests that for a \$1.00 increase in output from the aircraft and parts industry, the direct and indirect increase in output from the communications equipment industry (SIC 366) is slightly more than 4 cents. Columns (4) and (6) describe the same impacts, but the entries represent the estimated number of employees.

Notes

1. The problems facing specific firms in the state that produce for the defense industry have been well publicized. For example, see "Peace Yields No Dividend for Defense-reliant Economy," *Hartford Courant*, September 30, 1990, and "Defense Cuts to Affect State Firms," *Hartford Courant*, February 1, 1991. For region-specific articles, see "Recession Approaches, but Not Everywhere," *Wall Street Journal*, October 31, 1990, and Edward Moscovitch, "The Downturn in the New England Economy: What Lies Behind It?" *New England Economic Review*, July/August 1990, 53-65. In addition, see Richard A. Barff and Prentice L. Knight III, "The Role of Federal Military Spending in the Timing of the New England Employment Turnaround," *Papers of Regional Science Association* 65, 1988, for a historical overview of the impact of the military buildup on New England's economy.

2. The state also supplies for the defense industry such products as electronics and communication equipment, radar systems, and turbine engines for tanks. While federal government plans to reduce production of M1 tanks has cast doubts on the economic situation for Textron Lycoming (which employs about 4,000 in the state), there has been optimistic news for the firm; the government has approved a major sale of M1s to Saudi Arabia. However, the aircraft and parts and ship- and boat-building industries are of primary concern here because of the significant employment in these industries.
3. For example, see Kevin Bean, "Reconversion in Connecticut," *Social Policy*, Winter 1988, 46-49; Yolanda K. Henderson, "Defense Cutbacks and the New England Economy," *New England Economic Review*, July/August 1990, 3-24.
4. I am referring to input-output (I-O) analysis. I developed an eighty-one industry I-O table for the manufacturing sector in Connecticut, which serves as a source of reference for this article. (See Bruce D. Wundt, "Industrial Diversification and Manufacturing Employment Stability: A Study of the State of Connecticut," Ph.D. diss., Clark University, 1988.)
5. As measured by the coefficient of variation, a ratio of an industry's employment variations relative to its average size from 1964 to 1987.
6. In addition to Pratt & Whitney's efforts to reduce its reliance on government contracts and Sikorsky's seeking markets outside the United States for helicopter sales, their parent company, United Technologies, is preparing for future involvement in the space-launch industry.
7. Bruce D. Wundt, "Minimizing Employment Instability: A Model of Industrial Expansion with Input-Output Considerations," unpublished manuscript.
8. Promoting the expansion of the manufacturing base and retraining displaced workers are two issues of concern for state policymakers regarding economic conversion. Others include financial assistance to communities and individuals dependent on defense contracts. See *Hartford Courant* for the following: "Legislators Fight for Defense Firms," May 20, 1990; "House Weighs Aid to Displaced Defense Workers," July 20, 1990; and "State Defense Industry Prepares for Pentagon Cutbacks," January 28, 1990.