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IN THIS ISSUE

FEDERAL RESERVE BANK OF CLEVELAND

DEFENSE SPENDING IN FOURTH DISTRICT STATES

PART I: NATIONAL BACKGROUND

Defense spending, the major component of Federal Government spending, has elicited special interest in recent months, in view of both the Vietnam situation and the possible influence of such spending on the course of the economy. The fiscal year 1967 budget, which was presented to Congress on January 24, set forth Federal spending plans for July 1, 1966 to June 30, 1967. Within total Federal spending of almost $113 billion, the proposed administrative budget called for defense purchases of $58.3 billion, or $4.1 billion more than in fiscal 1966.

While it is still unclear as to the actual effects—direct and indirect—of the increase of defense spending on the economy at large, it is expected that the economic impact will be different in various regions of the nation. Accordingly, an important question is raised concerning the regional distribution of defense spending, in terms of both magnitude and nature. This article is the first part of a study undertaken by the Research Department of the Federal Reserve Bank of Cleveland to discern some insights into the regional effects of defense spending by reviewing various measures of defense activity in the states that are wholly or partly in the Fourth Federal Reserve District (Ohio, Kentucky, Pennsylvania, and West Virginia).

It should be noted that the lack of adequate data at the regional level makes it difficult to analyze completely the regional impact of defense spending, including that of stepped-up defense procurement. To illustrate, while defense spending *per se* is not broken down by state or region, military prime contract awards are. However, a substantial proportion of work under prime contracts is subcontracted to firms in the same or other regions, and the extent of subcontracting is not known. Thus, at best, prime contract data can give only a rough indication of total defense work in a region or area. Without using rather detailed interindustry studies or a direct survey of manufacturing firms, there are therefore only indirect means of assessing the regional effects of defense spending.

A brief resume of aggregate measures of defense activity, while giving little insight into regional effects, will provide perspective on the significance of defense spending for the national economy and on some of the implications for regional areas; in other words, set the stage for a discussion of the effects of defense spending in Fourth District states.

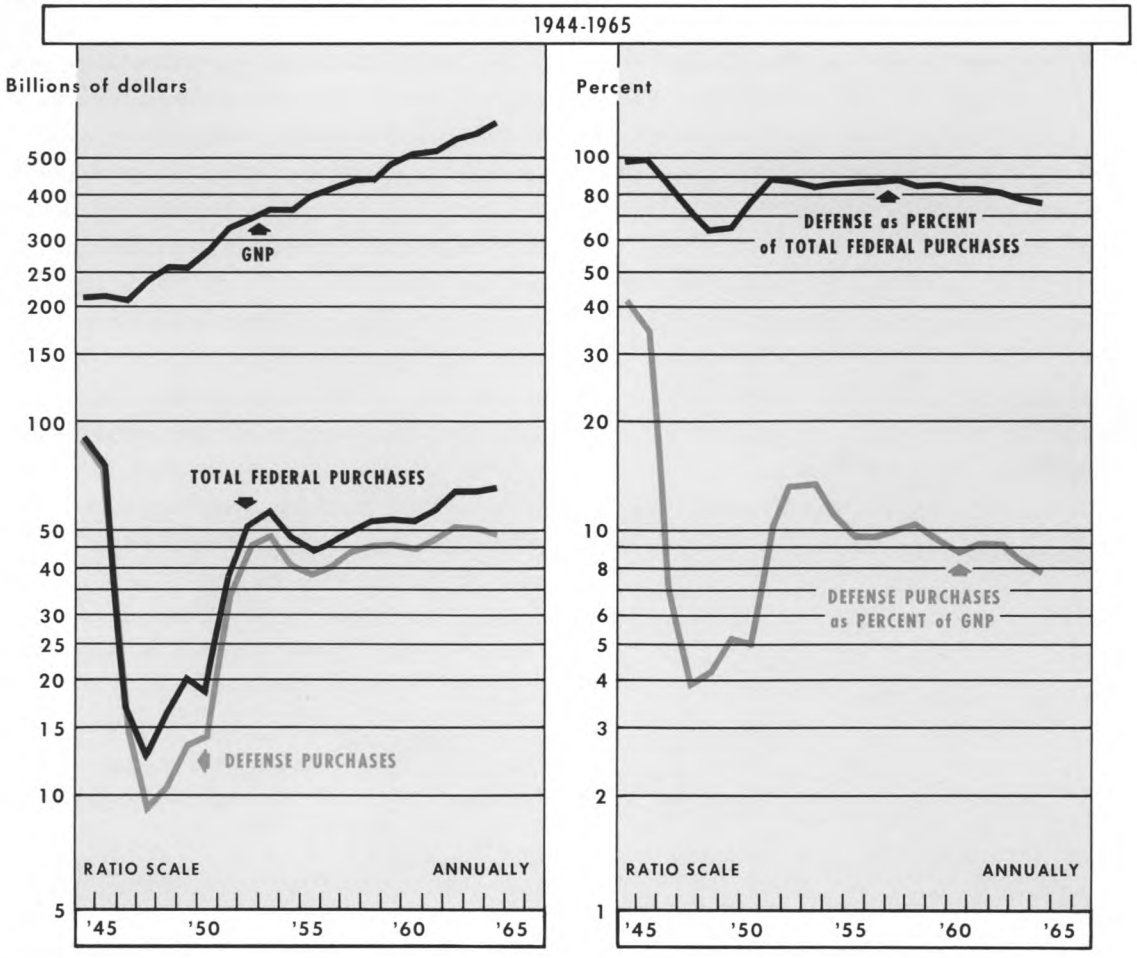
Accordingly, following the review of selected aggregate measures presented in this article, a number of indirect measures of the regional impact of defense for Fourth District states will be discussed in a subsequent article in the *Economic Review*.

SELECTED AGGREGATE MEASURES OF NATIONAL DEFENSE

Defense Purchases. Defense purchases, as recorded in the national income accounts, provide one means by which to judge the impact of national defense spending at the national level. This is the most comprehensive series that records defense spending in a framework consistent with the record of economic activity of other sectors. As shown in Chart 1, the peak in defense spending was reached during World War II, in 1944, when

1.

GROSS NATIONAL PRODUCT and FEDERAL GOVERNMENT PURCHASES of GOODS and SERVICES



Source of data: *Survey of Current Business*, Office of Business Economics, U.S. Department of Commerce

defense purchases accounted for 41.6 percent of GNP and 98.2 percent of all Federal purchases. After declining to a postwar low in 1947, defense purchases gradually increased until they jumped upward during 1951-53 because of the Korean War, and then subsequently fell in 1954 and 1955. Since that time, in the past decade, the cold war threat has necessitated maintaining defense purchases at a magnitude substantially above the pre-Korean War level.

Nevertheless, in recent years, the rate of growth of defense purchases has been less than the rates of growth of GNP and total Federal purchases; consequently, defense purchases had declined to 7.4 percent of GNP and about 75 percent of Federal purchases in the national income accounts by the first half of 1965. While the figures have recently been on the rise because of the effort in Vietnam, the actual magnitudes and proportions that will emerge in 1966-67 are not currently known. However, it should be noted that with a considerable growth of GNP, defense purchases could expand in each year without increasing the relationship to GNP.

Employment. Changes in employment are another indicator of the resources committed to defense uses. Comprehensive statistics are not available on the direct and indirect employment generated by the recent levels of defense spending, but employment can be traced for several defense-related industries, as well as for defense-related Federal Government employment. Five industries—ordnance and accessories, aircraft and parts, communication equipment, electronic components, and ship and boat building and repairing—have been designated as defense-related to the extent that a substantial proportion of their output flows into defense uses. Employment figures in recent years for each of the industries are presented in Table I along with data on defense-related Federal Government employment.[1]

While total employment in the five industries exhibited a moderate increase from 1958 to 1964, there were substantial changes among the individual industries. The industries showing the greatest gains were communication equipment, electronic components, and ordnance (including missile work); in contrast, there was a substantial decline in employment in the aircraft industry. These employment changes corresponded generally to changes in the mix of goods and services purchased by the DOD. Increased emphasis on missile development and production beginning in the late 1950's resulted in stepped-up procurement of electronic and communication equipment and related goods that are more essential for missile production.

Federal defense-related employment also exhibited a moderate increase during 1958-64, with growing numbers of military and NASA personnel offsetting the declining numbers of DOD civilian employees.

[1] It should be realized that not all of the output of these industries goes for defense purposes so that not all of the employment is defense dependent.

Defense-related Federal employment covers Department of Defense (DOD) military and civilian employment and employment in various agencies that perform work related to defense—National Aeronautics and Space Administration (NASA), Atomic Energy Commission (AEC), Selective Service Commission, and the Office of Emergency Planning. The bulk of Federal defense-related employment is in the DOD.

See Joseph F. Fulton, "Employment Impact of Changing Defense Programs," *Monthly Labor Review*, Vol. 87, No. 5 (May 1964), pp. 508-16.

TABLE I
Employment in Five Defense-Related Manufacturing Industries and Defense-Related Federal Employment, United States, 1958-1964

	(in thousands)						
	1958	1959	1960	1961	1962	1963	1964
Aircraft and parts	784	748	646	619	634	635	606
Communication equipment	296	340	382	405	445	434	406
Electronic components	179	213	234	243	266	262	264
Ordnance and equipment	145	176	202	235	269	274	258
Ship and boat building and repairing	147	146	141	142	141	142	144
Five-Industry Total	1,551	1,624	1,605	1,643	1,755	1,747	1,677
Defense-Related Federal Employment	3,675	3,571	3,511	3,577	3,857	3,759	3,750
Total Defense-Related Employment (selected industries and Federal Government)	5,226	5,195	5,116	5,220	5,612	5,506	5,427
Nonagricultural Employment	58,122	59,745	60,958	61,333	62,657	63,863	65,596
Employment in Five Defense-Related Industries as Percent of Nonagricultural Employment	2.7%	2.7%	2.6%	2.7%	2.8%	2.7%	2.6%
Total Defense-Related Employment as Percent of Nonagricultural Employment	9.0%	8.7%	8.4%	8.5%	9.0%	8.6%	8.3%

Sources: For five industries, *Report of the Committee on the Economic Impact of Defense and Disarmament*, Superintendent of Documents, U. S. Government Printing Office, July 30, 1965, p. 83. For defense-related Federal employment, Joseph F. Fulton, "Employment Impact of Changing Defense Programs," *Monthly Labor Review*, Vol. 87, No. 5 (May 1964), p. 511; 1964 figure is estimated. For nonagricultural employment, *Manpower Report of the President and a Report on Manpower Requirements, Resources, Utilization, and Training* by the United States Department of Labor, transmitted to the Congress, March 1965, p. 193.

On average, employment in the defense-related industries accounted for 2.7 percent of nonagricultural employment in the United States in the years shown in the table. When defense-related Federal employment is added, the average jumps up to 8.6 percent. The most recent year for which comprehensive payroll data are available is 1962 when payrolls for all defense-related employees amounted to $27.6 billion, or 6.3 percent of total personal income. (The total of defense-related employment for the five industries and the Federal Government was higher in 1962 than for other years covered in the table. This suggests that the ratio of payrolls to personal income would be lower in the years after 1962.)

Input-Output Analysis. The economic effects of defense spending go beyond the direct impact of dollar purchases on employment. Indirect effects are generated as firms selling products and services to the DOD, for example, increase employment, wage payments, and purchases from their suppliers. Suppliers in turn may further increase their employment and purchases, so that there can be substantial and widening indirect effects.

A social accounting technique which is useful in analyzing the secondary and tertiary effects of total defense or other spending is

Figure 1

ILLUSTRATION OF A MATRIX FOR INPUT-OUTPUT (INTERINDUSTRY) ACCOUNTING

Purchasing Sector / Producing Sector	Industry 1	Industry 2	Industry 3	••••	••••	Industry N	Total Intermediate Output	Final Bill	Total Output
Industry 1									
Industry 2		Purchases of industry 2 from industries 1, 2, 3. ⬇							
Industry 3									
••••••									
••••••									
Industry N	Sales of industry N to industries 1, 2, 3 and to final demand. ➡								
Total Intermediate Input									
Primary Inputs									
Total Input									

Source: Adapted from table in M.Yanovsky, *Social Accounting Systems*, Chicago, Alpine Publishing Company, 1965, p. 152

input-output analysis.[2] Input-output accounting is a method of tracing the flow of goods and services from industry to industry or from economic sector to sector. The overall economy is broken up into various homogeneous sectors or industries; each industry or sector appears twice in an input-output matrix—once as a row and once as a column. Figure 1 presents a simplified example of a limited input-output matrix. Each cell in the input-output matrix relates the input of that row (sale of the output of the industry in that row to the industry in that column) to the output of the industry in that column. In turn, this relationship can be reduced to an "input coefficient" which, when derived for all the cells of the matrix, can be used to determine the various inputs used to produce a given

[2] This type of analysis was developed by Wassily W. Leontieff, who constructed input-output tables for the U. S. for 1919, 1929, and, in conjunction with the Bureau of Labor Statistics (BLS), for 1939. The BLS also prepared an input-output table for 1947, and the Office of Business Economics of the Department of Commerce recently completed work on a 1958 input-output study, which is integrated with the national income and product accounts.

See Morris R. Goldman, Martin L. Marimont, and Beatrice N. Vaccara, "The Interindustry Structure of the United States: A Report on the 1958 Input-Output Study," *Survey of Current Business*, Vol. 44, No. 11 (November 1964), pp. 10-29.

output. Thus, the input-output matrix can explain the magnitude of interindustry flows in terms of the production levels of each sector.[3] Such a set of accounts can aid in the analysis of economic structure, as well as in the prediction of effects of increased demand for the output of various sectors or of the effects of increased or reduced Government defense spending.

The 1947 input-output matrix already has been adapted to aid in forecasting the effect of a reduction in defense spending.[4] A further adaptation of the input-output matrix to show the proportion of output of various industries going to defense is presented in Table II. It can be seen from the table that most industry groups are only slightly dependent upon defense demands. Those industries which do sell a substantial portion of their output to the military—including transportation and ordnance, instruments and allied products, and electrical machinery—are generally the same industries, as is shown later, that receive the bulk of military prime contracts awarded by the DOD.

TABLE II
Proportion of Final Output of Selected Industries Devoted to Defense Demands*

Transportation equipment and ordnance	38.4%
Electrical machinery	20.8
Instruments and allied products	20.2
Primary metals	13.4
Unallocated and waste products	12.3
Fabricated metal products	8.0
Fuel and power	7.3
Paper and allied products	7.0
Transportation	5.9
Rubber and rubber products	5.6
Chemicals and allied products	5.3
Machinery (except electrical)	5.2
Nonmetallic minerals and products	4.7
Lumber and wood products	3.9
Leather products	3.1
Miscellaneous manufacturing industries	2.8
Construction	2.1
Apparel and textile mill products	1.9
Food and kindred products	1.6
Trade	1.4
Service and finance	1.3

* Includes direct deliveries plus deliveries to other industries necessary for deliveries to this demand category, i.e., subcontractors and suppliers. Coefficients based on 1947 structural relationships.

Source: Murray L. Weidenbaum, "Measures of the Impact of Defense and Space Programs," Paper presented at annual meeting of American Statistical Association, Philadelphia, Pennsylvania, September 9, 1965, p. 18.

The indirect and induced effects of defense procurement should be recognized, although they cannot properly be quantified. Using defense-related employment as an example, the direct effect would be the employment generated by sales made by businesses directly to the Government. Indirect effects result when these defense-oriented firms purchase inputs from other firms. To illustrate, an increase in defense orders received by, say, Ohio firms will lead to increased employment to meet the greater demand for output (direct

[3] While the matrix presented in Figure 1 is a simplification, it does point out the general features of input-output analysis. Other sources should be consulted for a more complete and sophisticated presentation of interindustry accounting. See, for example, "The 1958 Interindustry Relation Study" obtainable from the Office of Business Economics (National Economics Division), U. S. Department of Commerce; Hollis B. Chenery and Paul G. Clark, *Interindustry Economics* (4th printing; New York: John Wiley and Sons, Inc., 1965); or Moshe Yanovsky, *Social Accounting Systems*, (Chicago: Alpine Publishing Company, 1965), p. 152. Additional sources are cited in these works.

[4] See Wassily W. Leontieff and Marvin Hoffenberg, "The Economic Effects of Disarmament," *Scientific American*, Vol. 204, No. 4 (April 1961), pp. 47-55. For a more recent analysis, see Wassily W. Leontieff, Alison Morgan, Karen Polenske, David Simpson, Edward Turner, "The Economic Impact—Industrial and Regional—of an Arms Cut," *The Review of Economics and Statistics*, Vol. XLVII, No. 3 (August 1965), pp. 217-41.

TABLE III
Total Employment[1] (Direct and Indirect)[2]
Per Billion Dollars of Delivery to Final Demand, 1962

	Defense-Related Industries			
	Ordnance & accessories	Electronic component accessories	Aircraft and aircraft parts	Communications except radio & TV broadcasts
Total	122,496	109,668	101,224	69,988
Direct	58,499	62,110	59,794	55,870
Indirect	63,997	47,558	41,430	14,118
Distribution of Indirect				
Agricultural, forestry, and fisheries	1,080	1,303	675	461
Mining	852	855	748	127
Manufacturing	45,302	25,864	27,824	4,454
Transportation	2,968	2,992	2,226	636
Communication and utilities	1,109	1,058	983	369
Trade	5,338	7,271	3,923	1,122
Finance, insurance, and real estate	1,749	1,783	1,221	999
Services and miscellaneous	5,601	6,429	3,826	5,955
Ratio of indirect to direct	1.09	0.77	0.69	0.25

1 Covers wage and salary employees, self-employed, and unpaid family workers.
2 Does not include "multiplier" effect, i.e., employment generated by respending of income for consumer and capital goods.

Source: Jack Alterman, "Interindustry Employment Requirement," *Monthly Labor Review*, Vol. 88, No. 7 (July 1965), pp. 842-44

effect). Because the Ohio firms will also have to increase inputs other than labor, indirect employment will be generated to supply the additional resources that the Ohio firms require. On top of this, there are induced effects as the increased direct and indirect defense employment generates more expenditures for consumer goods, houses, etc., and as business firms and state and local governments invest and expand to meet the new demands. Thus, a change in defense spending can have widespread indirect and induced effects.

Indirect effects are further illustrated by the use of interindustry employment requirement tables that can be derived from the input-output table referred to earlier. Such a table has been derived from the 1958 input-output study, and several defense-oriented components are reproduced in Table III. For example, the delivery of a billion dollars of products from the ordnance and accessories industry to the Government would generate 122,496 jobs. Of this total, 58,499 would be in the ordnance industry itself (direct) and 63,997 jobs would be in industries supplying parts, materials, transportation, and other services to the ordnance industry (indirect). In nearly all cases, the bulk of the indirect jobs will be in manufacturing.[5] (Because the interindustry employment requirements are calculated from

[5] For more insight into the indirect and subcontracting effects of a Government contract, see Kenneth G. Slocum, "Defense Fallout: How Pentagon Contract for $1 Billion Spreads Throughout Economy," *Wall Street Journal*, November 18, 1965.

TABLE IV
Military Prime Contract Awards for the United States, Fiscal Years 1951-1965
(millions of dollars)

Fiscal Year	Contracts	Fiscal Year	Contracts
1951	$29,620	1959	$21,919
1952	38,479	1960	20,407
1953	26,995	1961	22,112
1954	10,631	1962	25,039
1955	13,972	1963	25,234
1956	16,491	1964	24,417
1957	18,144	1965	23,268
1958	21,009		

Note: Data include only contracts with net value of $10,000 or more distributed by states.

Source: *Prime Contract Awards by State*, Office of Secretary of Defense, Department of Defense

the input-output table for the U. S. economy, such computations have the same limitations as input-output analysis and, of course, are not necessarily applicable to individual states or regions.)

Military Prime Contracts. Trends in military prime contract awards provide an additional way of viewing the overall impact of defense activity. Prime contract awards are contracts or orders awarded to firms to supply the DOD with various goods and services. More specifically, these awards cover procurement for such things as research and development, construction, petroleum, subsistence, clothing, and operating and maintenance supplies. Contract awards have the additional advantage of allowing a breakdown by state, and for recent years, by procurement program. (A procurement program is a grouping of items obtained separately under prime contract awards according to the nature of the object procured, such as missile and space products, or electronic components.) Such data facilitate to some extent analysis of the regional effects of defense spending.

A major limitation of prime contract awards for regional analysis is that not all, or even most, of the work for any contract is necessarily done by the firm receiving the contract. Prime contracts are awarded to firms performing the final assembly of the product and do not reflect the large amount of subcontracting which may be done by firms in other states. Thus, at best, prime contract awards are an imperfect guide to regional effects of defense spending.

Data on the dollar volume of contracts awarded in the U. S. since 1951 are presented in Table IV. The general pattern of prime contract awards is similar to that of defense purchases. Prime contracts reached a peak of $38.5 billion in fiscal year 1952, falling to a low of $10.6 billion in 1954, and then climbing again, reaching the recent high in fiscal 1963. Since that time, total military prime contract awards declined in fiscal 1964 and fell again in 1965. (The effect of the Vietnam buildup will appear in prime contract awards for fiscal year 1966, which began July 1, 1965.)

Available data on costs incurred by the AEC and prime contracts awarded by the

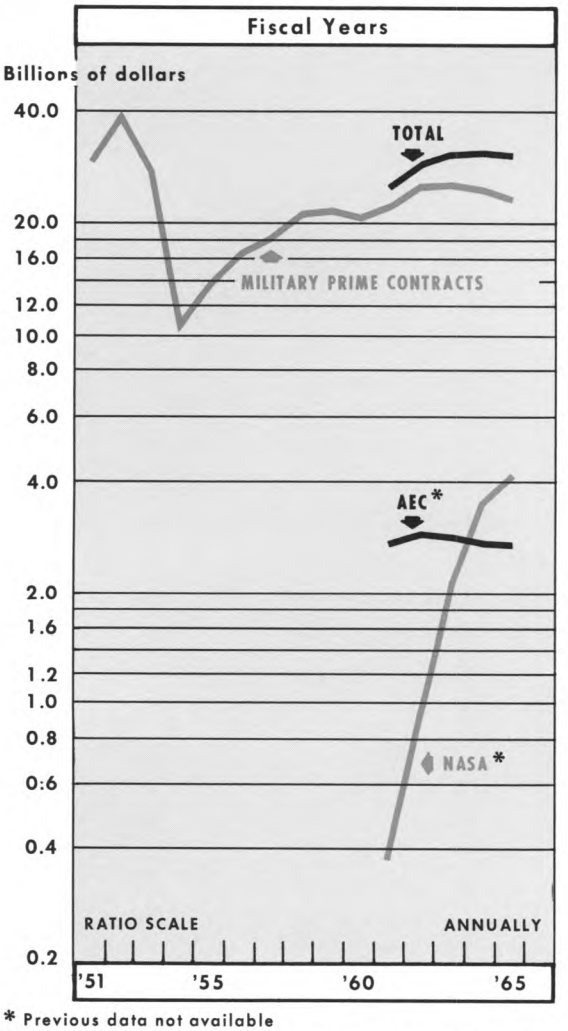
TABLE V
Costs Incurred by AEC and Prime Contracts Awarded by NASA Fiscal Years 1961-1965
(millions of dollars)

Fiscal Year	AEC	NASA
1961	$2,795	$ 380
1962	2,889	939
1963	2,830	2,181
1964	2,795	3,490
1965	2,748	4,103

Note: NASA awards cover contracts of $25,000 and over.

Sources: Atomic Energy Commission, and National Aeronautics and Space Administration

2.
MILITARY and NASA PRIME CONTRACT AWARDS, and AEC COSTS INCURRED, UNITED STATES



* Previous data not available

NOTE: Military prime contracts cover awards with net value of $10,000 that are distributed by state; NASA contracts cover direct awards of $25,000 and over; AEC awards consist of costs incurred for operating, maintenance, and capital expenditures.

Sources of data: *Prime Contract Awards by State*, Office of Secretary of Defense, Department of Defense; Atomic Energy Commission; and National Aeronautics and Space Administration.

NASA are presented in Table V.[6] The AEC and the NASA perform defense and nondefense work, although much of the civilian work also has defense benefits. Since these agencies do not operate under the DOD, their procurement is not included in military prime contract awards. Costs incurred by the AEC and contracts awarded by the NASA are of much smaller magnitudes than DOD military prime contracts. While the AEC costs incurred have fluctuated within a fairly narrow range since 1961, NASA contract awards have exhibited substantial growth, reflecting the acceleration of both defense and nondefense space and missile activity.

Chart 2 portrays the contract awards of the DOD and the NASA and costs incurred by the AEC, as well as the combined total. Combining contract awards and costs incurred is one way to view the overall picture of defense-related procurement. As shown in the chart, the combined series experienced a rather sharp increase in fiscal 1962, continuing to increase moderately until it reached a peak in fiscal 1964. The series then declined slightly in 1965. Changes in total awards and costs incurred are dominated by changes in DOD contracts, although the rapid growth of NASA awards did offset the decline in both AEC costs incurred and DOD contract awards in fiscal 1964.

The large dollar volume of military prime contract awards are concentrated among a relatively few firms engaged in defense work. Table VI shows the concentration of such

[6] Costs incurred are not the same as prime contracts awarded, but they are a fairly close approximation. Costs incurred cover operating, maintenance, and capital expenditures.

TABLE VI
Percent of Dollar Volume of Military Prime Contracts Received by Firms Involved in Defense Production Fiscal Years 1961-1965

Fiscal Year	Top 100 Firms	Top 50 Firms	Top 25 Firms	Top 5 Firms
1961	74.2%	65.8%	54.8%	24.8%
1962	72.3	63.4	50.8	22.5
1963	73.9	65.6	51.9	23.2
1964	73.4	65.8	52.9	23.8
1965	69.0	60.9*	48.3	22.9

* Based upon top 49 firms.

Sources: Joint Economic Committee, Background material on *Economic Impact of Federal Procurement:* Materials prepared for the Subcommittee on Federal Procurements and Regulations, 89th Congress, 1st Session, April 1965. Also, previous reports. For 1965, "Lockheed Holds a Steady Lead," *Business Week*, November 27, 1965, p.35.

awards among the top 5, 25, 50, and 100 firms receiving contracts during fiscal years 1961-65. It can be seen that the top 5 firms received slightly more than 20 percent of all military prime contract awards in the U. S., the top 25 firms about 50 percent, and the top 100 firms nearly 75 percent.[7]

Putting it another way, in each of the years except fiscal 1965, the top 4 firms received contracts totaling in excess of $1 billion. These large defense manufacturers, however, have many plants dispersed throughout the country and are not solely dependent upon Government purchases. Of 35 firms receiving the largest amount of defense and space contracts in 1963, such contracts accounted for half or more of the total sales of those companies in only 17 cases. The other 18 firms sold most of their output to nondefense customers.[8]

Data on prime contracts by procurement program, which are available only for fiscal years 1962-64, provide another indication of defense impact by pointing out the industries most closely linked with defense work. Data on procurement programs are presented in Table VII for both the three years separately and as three-year totals, because annual movements over the three-year period may or may not be indicative of changing procurement patterns. (The three-year total may give a better indication of the significance of any program by eliminating more or less random factors.) On the basis of three-year totals, the programs are ranked in descending order of dollar magnitude of program awards. The cumulative percentage distribution (last column) provides a means of judging the relative significance of various programs.

The missile and space systems accounted for more than one-fourth (26.1 percent) of all military prime contract awards during fiscal years 1962-64, while airframes and related assemblies accounted for 15.2 percent (41.3 percent less 26.1 percent). The top three programs accounted for over half of all military prime contracts, and the top ten programs for slightly less than 90 percent. Thus, the bulk of DOD procurement falls within a relatively

[7] The decline in concentration apparent in 1965 is primarily due to a decrease in missile and aircraft contracts which usually go to the larger companies.

There appears to be even greater concentration in NASA awards than in DOD contracts. In 1964, the top 5 firms received 50.8 percent of total NASA awards; the top 25 firms, 81.2 percent; and the top 50 firms, 87.1 percent. As a general matter, however, subcontracting tends to distribute defense work over a much larger number of firms and to reduce the degree of apparent concentration.

[8] See Murray L. Weidenbaum, "Measures of the Impact of Defense and Space Programs," Paper presented at annual meeting of American Statistical Association, Philadelphia, Pennsylvania, September 9, 1965, pp. 19-20.

TABLE VII
Net Value of Military Prime Contract Awards of $10,000 or More, by Procurement Program, for United States, Fiscal Years 1962-1964
(millions of dollars)

Program	Program Rank[1]	Fiscal Years 1962	1963	1964	3-Year Total	Cumulative % Age Distribution
Missile and Space Systems	1	$6,827	$6,855	$5,807	$19,489	26.1%
Airframes & Related Assemblies & Spares	2	3,178	3,658	4,493	11,329	41.3
Electronics & Communication Equipment	3	3,343	3,142	3,012	9,497	54.0
Services	4	1,555	1,834	2,216	5,605	61.5
Ships	5	1,559	1,746	1,529	4,834	68.0
Construction	6	1,205	1,117	1,296	3,618	72.8
Aircraft Engines & Related Spares	7	1,201	1,118	1,121	3,440	77.4
Ammunition	8	924	894	672	2,490	80.7
Petroleum	9	844	838	762	2,444	84.0
All Other Supplies & Equipment	10	824	735	715	2,274	87.0
Other Aircraft Equipment & Supplies	11	775	704	553	2,032	89.7
Subsistence	12	637	586	583	1,806	92.1
Combat Vehicles	13	554	574	353	1,481	94.1
Noncombat Vehicles	14	492	459	426	1,377	95.9
Textiles, Clothing & Equipment	15	419	266	272	957	97.2
Weapons	16	222	217	213	652	98.1
Construction Equipment	17	93	111	92	296	98.5
Production Equipment	18	102	105	60	267	98.9
Medical & Dental Supplies & Equipment	19	105	67	77	249	99.2
Photographic Equipment & Supplies	20	73	62	66	201	99.5
Materials Handling Equipment	21	41	66	54	161	99.7
Other Fuels and Lubricants	22	36	34	22	92	99.8
Military Building Supplies	23	23	41	20	84	100.0*
Transportation Equipment	24	3	3	0.7	6.7	100.0*
Separately Procured Containers and Handling Equipment	25	1	0.8	2	3.8	100.0*

* These programs constituted such a small percentage of the total that they were rounded to 100 percent.

1 Based on 3-year totals.

Source: Office of Secretary of Defense, U. S. Department of Defense, *Military Prime Contract Awards by Region and State, Fiscal Years 1962, 1963, 1964,* August 1965

few areas. The aerospace and electronics industries as a group accounted for almost 60 percent of prime contract awards. Economic effects of these awards, however, reach far beyond the aerospace or electronics industry.

CONCLUDING COMMENTS

Several notable aspects of defense spending emerge from the preceding review of selected aggregate measures. In recent years, less than 10 percent of the nation's resources have been absorbed by direct defense spending, and this ratio has been declining. This is apparent in the ratio of defense spending to GNP, in the ratio of defense-related private and Federal employment to nonagricultural employment, and as implied in the ratio of payrolls of defense-related private and Federal employment to personal income for 1962.

The Vietnam buildup has apparently arrested the decline in the ratio of defense purchases to GNP and may even raise it somewhat in the near future, although the actual magnitudes and proportions that will emerge from the buildup are not currently known.

In addition, the direct effect of defense procurement is generally limited with regard to industries and products involved. The top three procurement programs accounted for over 50 percent of procurement from 1962 to 1964, while the top ten programs accounted for almost 90 percent. The bulk of defense purchases has been for highly specialized products—aerospace products and electronic and communication equipment—which further indicates a high degree of concentration. There is not only concentration among the items procured, but also among the firms supplying the DOD. This suggests that changes in defense spending would have the greatest direct effect on a relatively few industries and on major firms within these industries.

The concentration of defense procurement among certain industries and major firms raises the likelihood of geographic concentration. That is to say, those areas or regions with the appropriate types of productive capacity to meet the specialized defense needs would be expected to receive the bulk of DOD procurement. As a result, changes in defense spending would be of considerable significance for employment and output of defense-oriented regions. Against this background, a subsequent article will explore, within the limits of available data, the significance of defense spending for Fourth District states.

SURVEY OF HIGH SCHOOL SENIORS IN CUYAHOGA COUNTY— SOME SOCIOECONOMIC PATTERNS

This article concludes a series of three articles[1] based on the May 1965 survey of high school seniors in Cuyahoga County and their plans for further education. As indicated earlier, the May 1965 survey is part of a broader study of the economics of higher education in the Cleveland area undertaken by the Research Department of this Bank with the cooperation of the Cleveland Commission on Higher Education. The purpose of the Commission is to aid in the development of higher education in the Cleveland area for the benefit of the local population and the community at large.

The May survey obtained information on two aspects of the socioeconomic background of the students, namely, family income and college attendance of parents. As discussed in the earlier articles, analysis of that information documented to a significant extent a number of patterns which are usually assumed on *a priori* grounds: children from homes with higher incomes where one or both parents had attended college tend to graduate from high school at an earlier age, plan to continue their education in greater numbers and actually do so, win more first-round and multiple acceptances from colleges, attend private colleges in and outside Ohio in greater numbers, and receive more scholarship awards.

To test further the validity of these findings, and perhaps uncover other patterns, student responses on plans to continue their education and acceptances received were related to census tract data[2] on median family income, nonwhite population, and persons of foreign stock.[3] Some insights into such relationships could be helpful in meeting higher education needs in the Cleveland area—and perhaps elsewhere—of those who look to area schools for post-high school education.

METHODOLOGY

Where appropriate, data for city schools have been arranged in configurations based

[1] The two earlier articles were: "Survey of High School Seniors in Cuyahoga County," *Economic Review*, November 1965, page 12; and "Survey of High School Seniors in Cuyahoga County—Some Additional Findings," *Economic Review*, January 1966, page 19.

[2] U. S. Census of Population: 1960 Final Report P.H.C. (1)-28, Census Tracts, Cleveland, Ohio S.M.S.A.

[3] The term "foreign stock" is used by the U. S. Census to include both foreign-born persons and native-born persons one or both of whose parents were foreign-born.

TABLE I-a
Selected Socioeconomic Variables (City of Cleveland) Compared with Intent to Continue Education and Acceptances Received
(May 1965 Survey of High School Seniors in the City of Cleveland)

Nonwhite Population as Percent of Total Population in High School Districts[1]	Median Family Income[1]	Percent of Fathers Attended College[2]	Percent of Mothers Attended College[2]	Percent of Students Intending to Continue[2]	Percent of Students Accepted-May 1965[2]
67% and over	$3,915	9%	8%	75%	17%
33-66.9%	$5,342	15%	13%	76%	23%
less than 33%	$6,436	13%	9%	64%	34%
Addendum: Figures for City of Cleveland as a whole 28.9%	$5,935	13%	10%	67%	31%

TABLE I-b

Persons of Foreign Stock as Percent of Total Population in High School Districts[1]	Median Family Income[1]	Percent of Fathers Attended College[2]	Percent of Mothers Attended College[2]	Percent of Students Intending to Continue[2]	Percent of Students Accepted-May 1965[2]
33-66.9%	$6,435	13%	9%	64%	34%
less than 33%	$4,935	14%	12%	76%	22%
Addendum: Figures for City of Cleveland as a whole 30.9%	$5,935	13%	10%	67%	31%

Sources: 1 Computed from census tract data—U. S. Census of Population, 1960
2 Federal Reserve Bank of Cleveland

on percentages of nonwhites and persons of foreign stock in the population of each school district (see Tables I-a and I-b). Data have also been aggregated into four groups, arbitrarily using the Cuyahoga River as the dividing line for both city and suburbs: Cleveland East and Cleveland West (Table II), and Suburbs East and Suburbs West (Table III). Data on students from the parochial high schools and from three Cleveland high schools are excluded from the aggregates because attendance at these schools is not geographically based.

CITY OF CLEVELAND PUBLIC HIGH SCHOOLS

Cleveland East is both more heavily populated and more diverse in its socioeconomic patterns than Cleveland West. As Table II shows, Cleveland West has a higher proportion of persons of foreign stock and the East a higher proportion of nonwhites. Persons of foreign stock are more widely dispersed geographically than are nonwhite persons. As shown in Table I-b, those areas with the highest concentrations of persons of foreign stock tend to enjoy fairly high incomes (higher than

the city-wide median of $5,935), and to have a slightly smaller percent of students intending to continue their education but a slightly higher rate of acceptance than the city-wide averages. As income decreases, the spread between intent and acceptance widens. As shown in Table I-a, those areas with the highest concentrations of nonwhites tend to have relatively low incomes (lower than the city-wide median), but higher rates of intent to continue education and lower rates of acceptance than the city-wide averages.

Perhaps the most significant pattern revealed by comparing data on student responses with racial and foreign-stock data is that, while the intent to continue education is high in areas with large nonwhite populations, the rate of acceptance by comparison is low (see Table I-a, lines 1 and 2). Conversely, in areas with a high percentage of foreign stock the rate of intent is lower but the acceptance rate higher (see Table I-b, line 1).

Turning to the first of the two observations made above, that is, the wider spread between rates of intent and acceptance in predominately nonwhite areas, a number of possible influences suggest themselves. For one thing, it is possible that the high intent rate may actually be an overstatement, reflecting a number of personal and psychological factors associated with responses to a question of this type. On the other hand, the wider spread between intent and acceptance may be due to inadequate scholastic preparation. Or, given the socioeconomic background of the students, it may be due to a lack of know-how or sophistication as to how, when, and where to apply to colleges and universities. Such

TABLE II

Socioeconomic Background of Seniors in the Public High Schools of the City of Cleveland and Intent to Continue Education and Acceptances Received as of May 1965

	Cleveland East	Cleveland West	City of Cleveland
Number of respondents[1]	2,096	1,311	3,407*
Median family income[2]	$5,583	$6,506	$5,938
Range of medians by census tracts[3]	$2,398-$9,770	$2,969-$8,857	$2,398-$9,770
Range of medians by school districts[2]	$3,915-$6,692	$5,904-$7,326	$3,915-$7,326
Nonwhite population 1960 census[2]	45%	2%	29%
Range of nonwhite population by census tracts 1960[3]	0-100%	0-43%	0-100%
Range of nonwhite population by school districts 1960[2]	2-76%	0-2%	0-76%
Foreign stock[2]	26%	39%	31%
Range of foreign stock by census tracts[3]	0-67%	20-55%	0-67%
Range of foreign stock by school districts[2]	9-45%	35-46%	9-46%
High school seniors planning to continue education[1]	69%	63%	67%
High school seniors accepted as of May 1965[1]	27%	37%	31%
Fathers attended college[1]	13%	13%	13%
Mothers attended college[1]	11%	8%	10%

* Excludes 848 students in the 3 Cleveland public high schools where attendance is not related to residence.

Sources: 1 Federal Reserve Bank of Cleveland
2 Computed from census tract data—U. S. Census of Population, 1960
3 U. S. Census of Population, 1960

TABLE III

Socioeconomic Background of Seniors in the Public High Schools of Cuyahoga County (Exclusive of the City of Cleveland) and Intent to Continue Education and Acceptances Received as of May 1965

	Suburbs East	Suburbs West	Cuyahoga County excluding City of Cleveland
Number of respondents[1]	5,765	4,926	10,691
Median family income[2]	$8,895	$8,190	$8,036
Range of medians by census tracts[3]	$5,996-$25,000+	$5,603-$12,187	$5,603-$25,000+
Range of medians by school districts[2]	$6,844-$15,724	$7,386-$10,447	$6,844-$15,724
Nonwhite population 1960 census[2]	*	*	*
Range of nonwhite population by census tracts[3]	0-35%	0-21%	0-35%
Range of nonwhite population by school districts[2]	Less than 1-4%	Less than 1-1%	Less than 1-4%
Foreign stock[2]	40%	32%	36%
Range of foreign stock by census tracts[3]	16-68%	13-50%	13-68%
Range of foreign stock by school districts[2]	21-46%	20-40%	20-46%
High school seniors planning to continue education[1]	78%	80%	79%
High school seniors accepted as of May 1965[1]	56%	56%	56%
Fathers attended college[1]	35%	33%	34%
Mothers attended college[1]	23%	21%	22%

* Less than 1 percent.

Sources: 1 Federal Reserve Bank of Cleveland
2 Computed from census tract data—U. S. Census of Population, 1960
3 U. S. Census of Population, 1960

aspects as incomplete forms, failure to file on time, lack of knowledge of scholarship and loan possibilities, little notion of how to match one's own interests and abilities to the varied offerings and requirements of the many colleges, universities, and specialized schools in the community, state, and nation, all have a bearing on the rate of acceptance, irrespective of what intentions may be. If the home is not experienced in such matters, the burden which falls upon the student seeking admission and the guidance counselors who aid him is correspondingly greater, no matter how well prepared the student may be academically. Finally, as shown in Table I-a, in the case where the spread between intent and acceptance is greatest, both median family income and the percent of parents who have attended college are the lowest, which tends to corroborate generally the foregoing reasoning as well as the findings of the earlier articles.

PUBLIC HIGH SCHOOLS IN CUYAHOGA COUNTY

The well-known differences between central-city and suburb are revealed by comparison of the data in Tables II and III. In the suburbs, median income in 1960 was more than $2,000 higher than in the city. In addition, the nonwhite population was less than 1 percent for the suburbs as a whole, compared with 29 percent for the city, and in no school district in the suburbs did the nonwhite population exceed 4 percent. In contrast, persons of foreign stock accounted for

5 percentage points more of the total population in the suburbs than in the city.[4] Also, the number of high school seniors planning to continue their education was 12 percentage points higher in the suburbs, while the number of those who had been accepted at the time of the survey was 25 percentage points higher. The proportion of both fathers and mothers who had attended college was more than twice as high in the suburbs.

Similar to the city, the suburbs east of the Cuyahoga River presented a more mixed pattern, showing the school districts with the highest proportion of nonwhites (4 percent) and the highest proportion of persons of foreign stock (46 percent). The eastern suburbs had both higher incomes and a wider range of incomes. Interestingly, however, there appears to be an income level above which students' own interests and capabilities may be as influential as income in determining intent to continue education. Accordingly, there was virtually no difference between East and West Suburbs in the percent of students indicating an intent to continue education, and no difference in the acceptance rate.

Figures for individual districts (not shown in Table III) confirm the strong influence of family income and college attendance of parents. In 1960, there were nine districts in which median family income exceeded $9,000. At least 84 percent of the students in each of these districts indicated an intent to continue their education, and in all but two at least 70 percent reported having been accepted (the exceptions reported 67 percent and 66 percent). In the same nine school districts, the proportion of fathers who had attended college ranged from 41 to 74 percent and of mothers from 24 to 58 percent. These compare with overall suburban figures of fathers 33 percent and mothers 23 percent. Such patterns likewise corroborate the conclusions drawn in the second article of this series regarding the marked impact that both family income and parents' education have upon children.

NOTE CONCERNING THE SPECIAL CLEVELAND CENSUS OF APRIL 1965

Data on nonwhite population by census tracts as determined by the Special Census of April 1965 have recently been released. While total population of Cleveland decreased by approximately 75,000 between 1960 and 1965, the nonwhite population increased from 253,108 to 279,352, or 10 percent. As of April 1965, the nonwhite population of Cleveland represented 34 percent of the total, an increase of 5 percentage points. Comparison of census tract data for 1960 and 1965 reveals that in most tracts showing an increase in the nonwhite population, a substantial proportion of nonwhites had also been reported in the 1960 census. However, a few tracts changed drastically in racial composition between 1960 and

[4] The inverse relationship between areas largely nonwhite and those with a relatively high percent of foreign stock is implicit in the definition of the terms "native born" and "foreign stock" (see footnote 3, page 14). Almost all Negroes are native born of native parentage, while about 40 percent of the white population of Cuyahoga County is of foreign stock.

1965. For example, of three tracts which had a nonwhite population of 0.1 percent or less in 1960, one increased to 84.5 percent in 1965, another to 58.2 percent, and a third to 57.7 percent. While the amount of change clearly was uneven in particular areas of the city, and the 1960 data used in Table I-a generally understate the proportion of nonwhites in various school districts, it was felt that relationships among the several socioeconomic factors used in this article would have had less validity if 1965 racial composition figures were compared with 1960 data on median incomes and foreign stock.

Income data for units smaller than counties are not available beyond those published in the 1960 Census. However, the Real Property Inventory of Metropolitan Cleveland (a private research organization) has attempted to relate number of families by census tracts in 1964 to 1960 median family incomes by census tracts, using classifications of income tenths. The three tracts cited above as having changed drastically in racial composition were found to have remained in the same income tenth between 1960 and 1964. This suggests that the general patterns described in this article are unlikely to have been altered appreciably since 1960.

Fourth Federal Reserve District