

1977

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Recommended Citation

Jesswein, W. A., & Lichy, R. W. (1977). Economic Impact of an Air Base On the Duluth-Superior Region. *Journal of the Minnesota Academy of Science, Vol. 43 No.3*, 6-9.

Retrieved from <https://digitalcommons.morris.umn.edu/jmas/vol43/iss3/3>

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Economic Impact Of An Air Base On The Duluth-Superior Region

WAYNE A. JESSWEIN,* RICHARD W. LICHTY**

ABSTRACT — The economic impact of the Duluth Air Base on the Duluth-Superior Growth Center was measured using an input-output table. A review of the impact results shows significant effects of the base on the area's industrial structure. A review of the results also shows the importance of the indirect effects in assessing the total impact on the region.

The impact of major government installations on regional and urban economies is an important yet often misunderstood phenomenon. This is especially true in light of recent closings or cutting back of operations at certain federal installations across the country. These closedowns and cutbacks have severely impacted particular areas of the country. The extent of potential impacts from such reductions is of major concern to state and local officials as well as to businesses in an affected area.

The purpose of this paper is to utilize an input-output table that has been established for the Duluth/Superior Growth Center Region of Northeast Minnesota plus Douglas County, Wisconsin, to measure the direct and indirect impact of an Air Force Base located in Duluth, Minnesota. The attempt will be made to isolate the economic impact of all USAF units located at the Duluth International Airport exclusive of their associated radar sites scattered in northeast Minnesota.

The following terms require further explanation:

ECONOMIC IMPACT — dollar and employment impact to the industrial structure of the Growth Center resulting from air base operations.

INDUSTRIAL STRUCTURE — 35 sectors ranging from agriculture, mining, and construction to wholesale trade, retail trade, and business services. The specific products or services included in each of the 35 sectors can be found in the 1967 Standard Industrial Classification Manual prepared by the Office of Statistical Standards of the Bureau of the Budget.

DULUTH-SUPERIOR GROWTH CENTER REGION — The Minnesota cities of Cloquet, Duluth, and Two Harbors and the City of Superior, Wisconsin.

USAF UNITS — The 4787 Air Base Group, the 4645 Air Defense Squadron, and Headquarters of the 23rd Air Division and 23rd North American Air Defense Region.

The paper does not include the Minnesota Air National Guard which is funded through state monies. Nor does it

include any personnel or resources associated with the operation of North Central Airlines or the Federal Aviation Administration, which are also located at the Duluth International Airport. Finally, it does not include impact funds for education (federal subsidy to local schools for education of military dependents or the Civilian Health and Medical Program of the Uniformed Services, a program for dependents and retired military members similar to Medicare.)

Data Collection Approach

The starting point in measuring the economic impact of the air base is to estimate the total number of dollars spent by the Air Base in the Duluth-Superior Growth Center Region. The dollar amount can then be analyzed through the input-output table to provide a measure of the inter-industry impact of the air base in dollar terms. This is possible since the input-output table describes the economic interdependence of the businesses that comprise the Growth Center's industrial structure in terms of the total number of dollars worth of inputs required from each industry to produce a dollar's worth of output for a given industry. Furthermore, by combining the physical labor input requirement per dollar's worth of output for each industry with the input-output and air base spending data, it is possible to measure the employment impact of the air base on the Growth Center.

The money spent by the air base is controlled at three points. The base's share of the Department of Defense's budget, or appropriated funds, is controlled at the Federal Procurement Office. This office establishes air base accounts with numerous vendors in Duluth, Superior, Minneapolis, the State of Minnesota, and the United States. These vendors provide a variety of services and commodities to the base. The Procurement Office also records, but does not control, decentralized purchases by the base.

Non-appropriated funds come from the Air Defense Command headquarters at Colorado Springs, Colorado. This money is controlled and recorded by the Non-appropriated Funds Financial Management Branch. These funds are used for entertainment clubs, the Aero Club, Military Welfare Fund, and the Central Base Fund. The expenditures range from purchases of recreational supplies to payments to entertainers.

The third segment of money included in this paper is dollar expenditures resulting from the air base payroll. The

The Minnesota Academy of Science

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government Finance Office controls payroll for the base as well as for personnel at radar sites and twenty other geographically separated units. Consequently, it was necessary to break out from the total base payroll the amount that would affect the Duluth-Superior Growth Center.

The totals presented in this paper for appropriated funds and payroll represent expenditures during Fiscal Year 1975 (FY 75), or calendar year 07-01-74 through 06-30-75. Because complete records were not available for FY 75 Non-appropriated Fund expenditures, it was necessary to use the expenditures recorded for the calendar year 01-01-75 through 12-31-75. According to base financial management personnel, the expenditures for the calendar year are not materially different from FY 75 expenditures. The air base spending data used in this paper were collected by Mr. Bernard Moog and Mr. Jeffery Brower, both of whom are employees of the base and graduate students in the Chapman College program located on the base.

Interindustry Expenditure Impact

The next step toward measuring the economic impact of the base is to estimate the distribution of these expenditures among businesses within the region. This step is necessary since the Growth Center input-output table does not have a "Military" sector with its own set of input coefficients and multipliers.

Table I presents the local expenditures for each of the three categories. The total of \$8,708,738 represents the direct expenditures which occurred in the Growth Center in 1975 by all components of the Duluth Air Base.

TABLE I - BASE EXPENDITURES

SOURCE OF EXPENDITURE	AMOUNT OF EXPENDITURE
Appropriated Funds	\$3,805,685
Non-Appropriated Funds	249,456
Payroll	4,653,597
TOTAL	\$8,708,738

The distribution of expenditures from Appropriated and Non-Appropriated Funds was determined by analyzing the monthly Base Procurement Management Report and other financial reports and records kept by the base. The distribution of expenditures from base payroll would follow the same general patterns as the expenditures of other households in the region. The general pattern of household expenditures in the region is shown by the household column of the Growth Center input-output table. Thus, taking the total payroll-based local expenditures of \$4,653,597 times each industry's coefficient in the household column of the table yields the distribution of such expenditures in the Growth Center. A summary of the estimated distribution of the base and base personnel expenditures is presented in Table II.

The expenditures shown in Table II are the number of dollars directly expended by all components of the Duluth Air Force Base in the Growth Center in 1975. However, each dollar directly spent by the base and its personnel generates a host of indirect transactions. Each industry in the Growth Center, in order to produce the goods or services purchased by the base or its personnel, must relate to other industries in the region in order to purchase the necessary

TABLE II - BASE EXPENDITURES BY SECTOR OF THE GROWTH CENTER

Sector	Direct Expenditures
Construction	\$1,480,165
Food & Kindred	2,111,404
Lumber, Furniture	64,194
Printing, Publishing	108,947
Chemicals & Allied Pr.	5,070
Petroleum, Refining	55,707
Stone, Clay, Glass	1,166
Fabricated Metal	3,498
Other Manufacturing	27,985
Trucking	19,812
Other Transportation	388,412
Electrical Utilities	359,935
Gas Utilities	19,822
Other Utilities	54,088
Wholesale	268,185
Retail	1,204,393
Finance, Ins. Real Est. (FIRE)	1,283,292
Hotels, Personal Services	234,346
Business Service	145,467
Medical, Educational	520,197
Other Services	299,497
Federal Government	46,105
State, Local Government	7,051
TOTAL	\$8,708,738

intermediate goods and raw materials. The sum of all of these secondary transactions is referred to as the indirect effect. The total impact of the air base on the Growth Center is the sum of the direct and indirect effects.

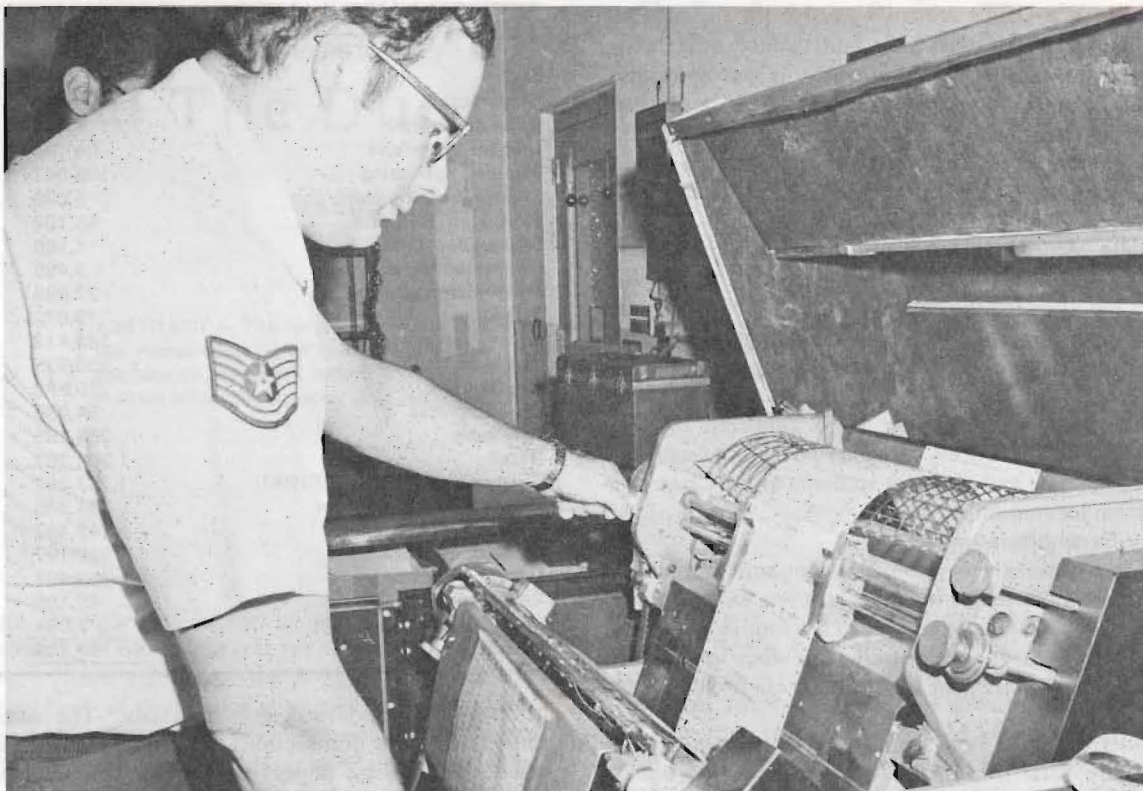
The input-output multiplier for each industry in the table shows the direct and indirect effects on the Growth Center that take place as a result of some initial expenditure for that industry's final good or service. Thus, the total impact of the air base on the Growth Center can be found by taking the direct expenditures of the base and its personnel in each industry times each industry's multiplier. The results of this calculation for each industry in the Growth Center is shown in Table III. As can be seen, the direct base expenditure of \$8,708,738 generates a total impact of \$10,013,720.

Impact On Employment

Another type of air base impact that can be estimated using the input-output framework is the impact of expenditures on

TABLE III - DIRECT AND INDIRECT IMPACTS

Sector	Multiplier	Direct Expenditures	Total Impact
Construction	1.158094	\$1,480,165	\$1,714,170
Food & Kindred	1.079628	2,111,404	2,279,531
Lumber, Furniture	1.226113	64,194	78,709
Printing, Publishing	1.066820	108,947	116,227
Chemicals & Allied Prod.	1.146211	5,070	5,811
Petroleum, Refining	1.173752	55,707	65,386
Stone, Clay, Glass	1.200749	1,166	1,400
Fabricated Metals	1.092405	3,498	3,821
Other Manufacturing	1.087734	27,985	30,440
Trucking	1.067301	19,812	21,145
Other Transportation	1.110520	388,412	431,339
Electric Utilities	1.034431	359,935	372,328
Gas Utilities	1.020259	19,822	20,224
Other Utilities	1.093721	54,088	59,157
Wholesale	1.169407	268,185	313,617
Retail	1.154552	1,204,393	1,390,534
Finance, Ins. Real Est.	1.214479	1,283,292	1,558,531
Hotels, Personal Serv.	1.275119	234,346	298,819
Business Service	1.231131	145,467	179,089
Medical, Educational	1.226586	520,197	638,066
Other Services	1.233979	299,497	369,537
Federal Government	1.214809	46,105	56,009
State, Local Government	1.389001	7,051	9,794
TOTAL		\$8,708,738	\$10,013,720



Tech. Sgt. Michael Cooper monitors a computer printing the payroll for the Duluth Air Base. About 1,200 military men and women and 450 civilian employees are covered. Their total pay for the year is more than \$20,000,000.

the employment in the region. This can be accomplished by utilizing employment multipliers for each industry in conjunction with the total spending impact resulting from the base or its personnel for each industry. An employment multiplier simply shows the total (direct and indirect) number of units of labor required per dollar's worth of goods or services from a particular industry. It is calculated by multiplying the employment-output ratio for each industry by that industry's direct and indirect output requirements as shown in the input-output table. Therefore, the employment impact for any industry can be found by taking its employment multiplier times the total spending resulting from the base or its personnel for that industry.

However, before this procedure can be performed, it is necessary to restate the total spending in terms of constant dollars. This is necessary since the Growth Center input-output table and accompanying employment multiplier are based on purchases and sales valued in terms of 1970 prices, while base spending is valued in terms of 1975 prices. In light of this, failure to restate the 1975 spending in terms of 1970 prices would overstate the actual employment impact. This is the case because inflation has caused the current dollar value of sales and purchases to rise sharply since 1970. Therefore, because of the way in which the employment multiplier is determined, it would appear as though much more labor would be required to produce a given quantity of output than in fact would be the case simply because the dollar value of the output is higher than at the time the multiplier was determined. It should be noted that this price adjustment was not required in estimating the dollar impact of the base because it is arrived at by making dollar-to-dollar comparisons rather than labor input per

dollar comparisons. Table IV presents the total dollar impacts resulting from spending by the base and its personnel in terms of 1970 prices.

Taking these deflated spending totals times each industry's employment multiplier yields the actual employment impact of the air base on that industry. Table V shows the results of this calculation for each industry affected in the Growth Center as well as the total employment impact for all industries. As can be seen from the table, the employment resulting from total base expenditures is more than 444 persons. It should be noted that this represents employment generated in the Growth Center by base spending and does not include any employment directly occurring at the air base itself.

A review of the economic impact on the Duluth-Superior Growth Center shows that the base does have a significant impact on the area's industrial structure. The base does not exist in a vacuum. It interrelates, in some cases very strongly, with other sectors of the local economy. Any change in air base operations or expenditures, therefore, will necessarily bring about changes in other sectors of the economy. The impact results provide a means of measuring or estimating the size of these effects.

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TABLE IV - TOTAL BASE SPENDING, 1970 DOLLARS

Sector	Payroll Spending 1970 Dollars	Appropriated and Non-	
		Appropriated Fund Spending, 1970 Dollars	Total Spending 1970 Dollars
Construction	\$ 38,633	\$1,075,949	\$1,114,582
Food and Kindred	467,989	1,121,923	1,589,912
Lumber and Furniture	26,341	21,998	48,339
Printing and Publishing	80,779	1,260	81,985
Chemicals, etc.	3,512	306	3,818
Petroleum Refining	28,975	12,973	41,948
Stone, Clay and Glass	878	0	878
Fabricated Metal	2,634	0	2,634
Other Manufacturing	21,073	0	21,073
Trucking	13,170	1,748	14,918
Other Transportation	292,384	95	292,479
Electric Utilities	121,168	149,867	271,035
Gas Utilities	14,048	878	14,926
Other Utilities	3,512	37,217	40,729
Wholesale	201,947	0	201,947
Retail	674,327	232,596	906,923
*F.I.R.E.	948,262	18,063	966,335
Hotels, Personal Services	147,509	28,956	176,465
Business Services	8,780	100,758	109,538
Medical and Education	389,845	1,870	715
Other Services	1,756	223,769	225,525
Federal Government	6,146	28,572	34,718
State & Local Government	5,268	41	5,309
TOTAL	\$3,498,948	\$3,058,837	\$6,176,473

*Finance, Insurance, Real Estate

TABLE V - EMPLOYMENT IMPACT

Sector	Total Spending 1970 Dollars	Employment Multiplier	Employment Impact
Food and Kindred	1,589,912	.000029763	47.321
Lumber and Furniture	48,339	.000045791	2.213
Printing and Publishing	81,985	.000020021	1.641
Chemicals, Etc.	3,818	.000017114	0.065
Petroleum Refining	41,948	.000024254	1.017
Stone, Clay and Glass	878	.000042154	0.037
Fabricated Metal	2,634	.000024758	0.065
Other Manufacturing	21,073	.000094237	1.986
Trucking	14,918	.000050422	0.752
Other Transportation	292,479	.000040233	11.767
Electric Utilities	271,035	.000030423	8.426
Gas Utilities	14,926	.000029456	0.440
Other Utilities	40,729	.000052942	2.156
Wholesale	201,947	.0000106613	21.530
Retail	906,923	.0000194647	176.530
*F.I.R.E.	966,335	.000035869	34.661
Hotels, Personal Services	176,465	.0000126589	22.339
Business Services	109,538	.000066207	7.252
Medical and Education	391,715	.0000103131	40.398
Other Services	225,525	.0000149051	33.615
Federal Government	34,718	.0000232378	8.068
State and Local Government	5,309	.0000124843	0.663
TOTAL	\$6,557,785		467.452

*Finance, Insurance, Real Estate

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