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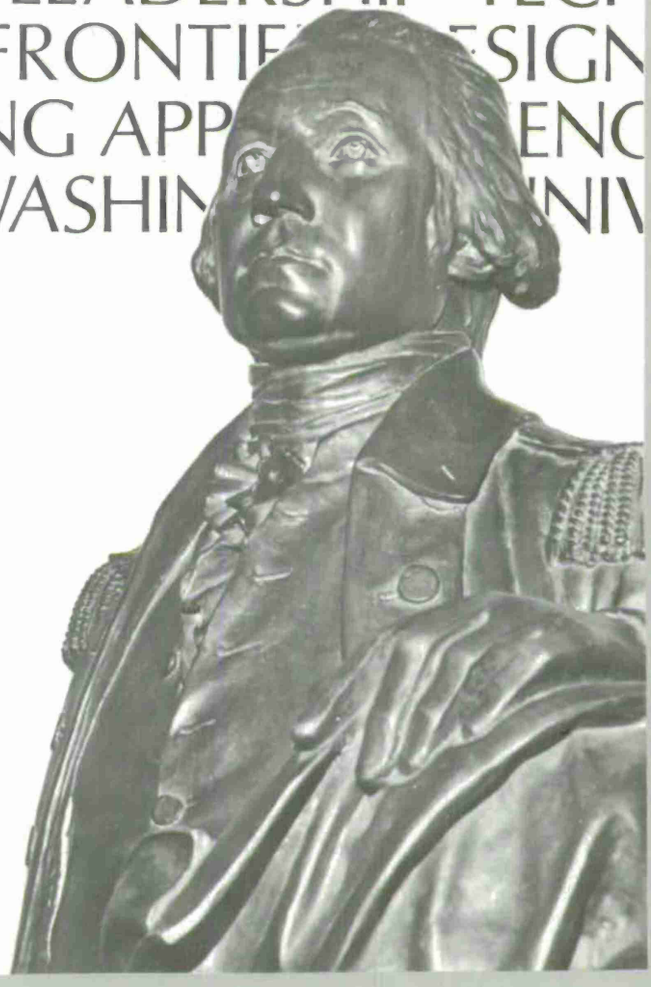

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AN OVERVIEW OF STUDIES OF THE IMPACT OF MILITARY INSTALLATIONS AND THEIR CLOSINGS ON NEARBY COMMUNITIES

by

Nora C. Buckley

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THIS PAPER EXAMINES THE IMPACT OF A MILITARY INSTALLATION ON NEARBY COMMUNITIES. RECENT RESEARCH INTO THE EFFECT OF THE PRESENCE OR CLOSING OF AN INSTALLATION IS ASSESSED, WITH PARTICULAR EMPHASIS PLACED ON THE METHODOLOGIES APPLICABLE TO THE QUESTION. A SUMMARY AND EVALUATION OF RESEARCH TO DATE IS PRESENTED.

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This paper examines the impact of a military installation on nearby communities. Recent research into the effect of the presence or closing of an installation is assessed, with particular emphasis placed on the methodologies applicable to the question. A summary and evaluation of research to date is presented.

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1. Introduction

Assessing the impact of military installations upon nearby communities has become an important topic in the literature concerning the economics of defense. This paper presents a review of the literature on the effects of a military installation upon a nearby community. It describes the methodological approaches used by researchers and the empirical results thus far obtained. Though the scope of this paper is limited to analysis of the effects of military bases on local areas, there exists a broader question concerning the overall effects of defense expenditures on the national economy. Discussion of these effects and their welfare implications, however, is beyond the scope of this review.

The new-found saliency of the base closings problem is primarily the result of the consolidation and reorganization of military facilities that began with the Kennedy administration in the early 1960's. Between the initial announcement of the Secretary of Defense in March 1961 and 1969, about 1,000 military installations or defense industrial facilities have been cut or closed.[1] The bulk of these events occurred in the early

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[1] John E. Lynch, Local Economic Development after Military Base Closures (New York: Praeger Publishers, 1970), p. 6.

1960's but the reorganization initiated by Secretary McNamara is yet ongoing, as evidenced, for example, by the announced closings of such major installations as Fort Irwin, California; Ft. Holabird, Maryland; the Naval Air Station in Brooklyn,[2] and the most recent announcement in April 1976 of further realignments.

The research into military installation impact on local communities was begun primarily as a result of the public outcry that was heard as installation closings were announced.[3] A typical illustration of the problems communities face when government facilities are closed is revealed by the transcript of public hearings conducted in 1961 by the Senate Commerce Committee. The following is an excerpt from the presentation of a spokesman for the Metuchen, New Jersey Chamber of Commerce:

> "When the decision to close the arsenal [Raritan Arsenal, New Jersey] was reached, did the Defense Department consider:
>
> 1. The 2,600 civilian employees, 52 percent of them have been employed by the Government for 15 years or more, who will either have to pull up established roots or seek new positions at advanced ages?
>
> 2. The impact that the closings would have on an area which already has an unemployment figure of 6.2 percent as of August 1961 -- and which was higher at the time of the announced closing -- and that 1,800 of the people employed at the arsenal reside in this labor surplus area?
>
> 3. Did they consider that well over $11 million were earned at the arsenal and spent in this central New Jersey area?
>
> 4. Did they consider that among many others, the arsenal purchases in the area exceeded $749,000 annually for trucking, $4,500,000 for contracts involving services and materials and over $90,000 for cash transactions?

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[2]Murry L. Weidenbaum, The Economics of Peacetime Defense (New York: Praeger Publishers, 1974), p. 112.

[3]A recent example is provided by Bill Richards, "Town Fears Chaos If ABM Site Shut," The Washington Post, Monday, October 20, 1975 (Vol. 98, No. 319), p. 1, Col. 5.

5. Did they consider the fact that perhaps $100 million of the central New Jersey economy is generated by Raritan Arsenal?"[4]

The need to establish exactly how and to what extent communities might feel the impact of closings was then and is clearly important.

To put the base closing problem into perspective seems to be necessary, yet at the same time, difficult. It is necessary in light of the fact that the Department of Defense (DoD) estimated that the initial cutbacks were saving the federal government nearly $1.6 billion annually.[5] On the other side of the coin, obtaining an accurate assessment of the cost to local communities is extremely difficult. For one thing, an immediate anomaly is noted in that the DoD carries to this day approximately the same number of installations on its books as it did when the closures began. These installations vary in size from Fort Hood, Texas to one-acre plots which happen to contain a stray landing strip radar screen. Until impact studies came into vogue in 1971, the DoD made no differentiation between installations as to their size and/or the number of personnel attached. Further, the only publicly available records of installation closings are the large number of individually released DoD press statements. Moreover, these announcements are on a state-by-state basis; they do not identify the communities affected. The problem of gathering an appropriate data base is further complicated by the fact that civilian federal government workers are often employed in military installations and one should take account of their employment as well as that of military personnel. More generally, since it is difficult to separate the effects of military base operations from those of other government facilities, it is useful to consider the joint impact of all federal government employment, including the military, on local communities.

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[4]U.S. Congress, Senate Commerce Committee, "Deactivation of Military Installations" (Washington, D.C.: Government Printing Office, 1962), p. 46.

[5]Lynch, op. cit., p. 7.

It is readily apparent, then, that there exist severe problems in identifying the communities affected by base closures and the size of the installation proximate to them. Even when such information is developed, further problems in analyzing base-closure impact are apparent from the start. In determining the magnitude of the effect of an installation close-out one needs to assess not only the immediate, direct impact but also the indirect effects of these federally directed reductions. Not only the nature of the effects and their magnitude must be considered, but the temporal extent of these effects should be evaluated also.

But, perhaps the greatest difficulty in analyzing base closures lies in the fact that base closures or openings may not be distinct events. Up until the massive DoD reorganization in the early 1960's, the federal government played no role at all in the economic adjustment of affected communities. However, in 1961, the DoD initiated the Office of Economic Adjustment (OEA) and the White House formed an advisory committee to the Secretary of Defense. Both offices were created "to assist in meeting those unemployment and other economic problems of communities affected by the termination of military installations."[6] Acting upon the request of a community, these offices attempt to assess potential problem areas, help plan conversion of military facilities into civilian uses, and coordinate the activities of federal agencies in these communities. Further, the Interagency Economic Adjustment Committee was created in 1970, and chaired by the Secretary of Defense.[7] The committee is charged with "assisting individuals and communities in cases where adverse economic impacts occur as a result of the revision of the nation's military base structure."[8] Since the early 1960's, then, base closings have been accompanied by advice, assistance, and funding from a

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[6]White House letter from Special Assistant to the President, Frederick G. Dulton (May 9, 1961), as cited in Lynch, ibid., p. 6.

[7]Darwin W. Daicoff, "The Community Impact of Military Installations," The Economic Consequences of Reduced Military Spending, ed. Bernard Udis, (Lexington, Mass.: D.C. Health and Company), 1973, p. 155.

[8]Daicoff, ibid.

number of sources including not only the DoD but also such agencies as the Small Business Administration and the Economic Development Administration, among others. Aside from assistance from the federal government, some communities have obtained state aid in conjunction with the local conversion efforts.[9] Thus, while the closing of a military installation taken as an isolated event might well have a quite significant impact on local economic activity, in some cases, the adverse affects are off-set by mitigating activities on the part of local, state and federal government.

The bulk of the literature concerning the impact of military installations on nearby communities has related specifically to the question of the results of base closings. A few investigations have studied the effect of installation openings and some have examined the impact that an extant installation has on the on-going economic activity of a nearby community. As the latter are particularly illuminating, a brief overview of this portion of the literature is provided below.[10]

Intuitively, it is apparent that the presence of a large military installation affects many aspects of community economic activity, just as would the presence of any major locus of economic activity. A military base provides employment to community residents in two ways -- through direct government service employment and employment generated by the use of non-appropriated funds, e.g., employment in officers and NCO clubs, base exchanges, etc. In addition, some military personnel and their dependents enter the local labor market. Although these individuals compete with local residents in the job market, it is not unlikely that their incomes add to the total community demand for goods and services. As in the case of other federal expenditures, both the employment and income effects of the base presence involve multiplier effects.

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[9] Lynch, op. cit., p. 10.

[10] Subsequent presentation borrows heavily from the work of Darwin W. Daicoff, Adjustment of the United States to Reductions in Military Spending (Washington, D.C.: Arms Control and Disarmament Agency, 1970) and John E. Lynch, op. cit.

Installation procurement and construction activities impact also in varying degrees on local business and local contracting at the retail and wholesale level. Thus, communities located near military installations may be expected to have a larger retail and service sector than other communities of similar size, since military personnel and their dependents represent exogeneous demand for retail and other services either not offered on the installation or not offered in great enough quantity or variety. Another sector, aside from the retail and service sectors, which would be affected by the presence of a military base is housing, as military personnel and their dependents enter both the sales and rental markets. Local transportation and utilities may also be involved in the installation-local economy nexus. Taxis and bus lines may be utilized by installation personnel, and local utilities are usually contracted by the federal government for base support. Thus, the presence of DoD personnel affects not only the absolute level of income and employment in a community but also the structure of economic activity.

Other impacts may also be noted. Local government is supported by the presence of government workers in terms of local, payroll, and sales taxes collected by the community. Also, property values in the community may be supported or actually increased by the presence of the military in a community. In addition, communities may qualify for federal "impacted-area" funding. Usually, these funds are provided to cover incremental expenses imposed on the local educational system as a result of the presence of government workers, but it may also be expanded, particularly with a newly-opened installation, to include funding for additional local police and fire fighting forces.

Overall, the effects discussed above would tend to increase the economic well-being of a community located near a military installation. Other factors, however, can have a negative impact. One is that while local governments benefit by income derived from local and sales taxes, the property tax base is eroded by the installation as federal land is non-taxable. Compounding this problem is a related one, namely, the need to increase local government expenditures for social services to support military personnel and their dependents. While impact area funding is available to

cover some of these services, there is no guarantee that it will be obtained or that the quantity of funding will be sufficient. Finally, as both Daicoff and Savage point out,[11] the presence of a military installation may discourage further efforts to broaden the community's base, as the area's work force may be comfortably employed by the Department of Defense. Thus, the work force which would be required to attract new civilian industry may not be available.[12]

To complicate the matter further, the magnitude of the impact of these effects may vary from community to community. It is not unlikely that the impact of an installation may vary with its size and the size of the community in which it is located. One would expect, ceteris paribus, the larger the size of the base relative to the size of the community, the greater would be its impact. Second, the impact could depend on such variables as the civilian employee to military employee ratio, the average pay level of DoD employees and the installation's purpose (training, support, etc.). One would expect that the greater the ratio of civilian to military employees, the greater would be the economic impact of a base, as civilian (and therefore off-post residents) would interact more fully with the civilian community. The higher the average pay level of civilian employees, the higher is their average income, and, therefore, one would hypothesize that a greater impact would be registered. The installation's purpose, in terms of being a training facility or support facility, may be important. One might expect a training installation to have a high percentage of unmarried, young, and relatively low-paid personnel. On the other hand, a support facility would have a more permament staff, and consequently a larger percentage of higher-paid personnel. Therefore, the support facility would interact more fully with a local community. Another consideration should also be examined, i.e., the presence or absence of commissaries, base

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[11] V. Howard Savage, "The Interdependence of the San Antonio Economic Structure and the Defense Establishment," Land Economics, Volume L, No. 4 (November 1974).

[12] Daicoff, Adjustments, op. cit.

exchanges, and on-post housing. The greater the number of these facilities in relation to personnel, the less would be the impact of the installation on the local community as spending would be in-house. Further, the length of time the installation has been in operation is a factor to be considered. The longer the installation has been extant, the greater the interdependency and integration of the community's economy with the installation and, therefore, the greater the impact (at least with regard to a potential base-closing). A final and related point would be the extent and diversity of the economic base of the community. Other things being equal, the more diverse the economic base, the less should be the impact of the base, at least in terms of base closing.

Considering the extent of the economic interaction of a military installation and its satellite community and the factors governing this nexus, and the strong reaction of local residents to announcements of base closing, it is interesting to note that the DoD considers the economic effects of base closings only in terms of the overall DoD budget. That is to say, while efforts are made to mitigate the effects of a base closing at the community level, the Department of Defense, according to one Pentagon official, can "ill afford to depart from the strict standards of military effectiveness in order to aid any economically distressed region or community."[13] So, while the effects of an opening or closing are understood at the federal level, ultimately decisions concerning these realignments of military bases are made irrespective of the economic health of a community. Aid or assistance is provided post facto.

2. Methodological Approaches to the Problem

While this introduction to understanding the impact of a military installation on a nearby community is straightforward, measuring the impact of base closings, as noted, is a thorny problem. Economists and planners have resorted primarily to two basic methods of analysis: a general case study approach, and economic base analysis. While both of these approaches have their inherent limitations, the bulk of the literature concerning military base impact employs one of these two techniques. Variations of these two approaches, as well as distinctly different methodologies, have been used but

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[13] Lynch, op. cit., p. 9.

these are relatively few in number. The methodologies are now briefly examined using a framework provided by Geraldine Sica.[14]

a. Case Specific Studies

One of the earliest studies examining the base impact problem was conducted by Gerald Breese.[15] In this study the approach of comparative statistics was used to evaluate the impact of five installation openings; two were military installations, one was an Atomic Energy Commission installation, and the remainder were large defense contractor installations. While each sub-study differed in scope, generally, both absolute and relative changes in a number of community economic indicators, before and after an opening, were examined. These indicators included, for example, employment, retail sales, land values, and the housing market. The effects varied widely, community by community, with no discernable pattern. However, one general conclusion was drawn: the opening of a large installation places great stress on the finances of a community.[16]

Another, more recent but not atypical, general case study employed a different approach in looking at the impact of the opening of an antiballistic missile complex on a rural county in northeastern North Dakota.[17]

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[14]Geraldine P. Sica, "A Preliminary Bibliography of Studies of Economic Effects of Defense Policy and Expenditures," The Defense Economy, ed., Seymour Melman (New York: Praeger Publishers, 1970). This bibliography is one of the most complete available on the general topic of disarmament. Another more recent compilation of sources is found in Judith Roswell, Arms Control, Disarmament, and Economic Planning: A List of Sources (Los Angeles: Center for the Study of Armament and Disarmament, 1973) Political Issues Series, Vol. 2, No. 3.

[15]Gerald Breese, et al. The Impact of Large Installations on Nearby Areas (Beverly Hills, Ca.: Sage Publications, 1965).

[16]Breese, ibid., p. 604.

[17]Randal Coon, et al. "The Impact of ABM Development on the Langdon Area," Department of Agriculture Economics, North Dakota State University, Fargo, N.D., 1974 (working paper).

In this study, questionnaires and interviews were used to obtain information from residents of the county and community leaders. The respondents expressed opinions concerning their perception of the base opening in terms of themselves, the community, and the business and economy of the area. The study was interesting because of the topicality of the Safeguard System, and because data were collected or developed that are normally difficult to obtain on a county level. The data included information on migration, a special census of population undertaken in 1972, information on public school enrollment, and data on total retail sales for the area during 1968-73. The study concluded that the ABM site, indeed, had posed problems for the community, particularly with regard to its impact on the community infrastructure, e.g., housing. It is also noted, more positively, that some impacted funding was provided, some community services were improved, and local retail sales jumped spectacularly. For example, between 1968 and 1973, sales in Langdon and Nekoma, the two towns closest to the Safeguard complex, rose 955.1 percent and 399.4 percent, respectively. Finally, we are given the comment of one survey respondent who noted that the "impact on Langdon can be compared to the problem a 180 pound person would have if he woke up one morning weighing 250 pounds."[18]

The Breeze and North Dakota State University studies were concerned with the effects of a base opening. However, most of the studies of individual communities have examined the projected and post facto effects of the closing of an installation.[19]

One such base closing study by the Office of Economic Adjustment (OEA) provides an interesting parallel to the study of the opening of the Safeguard site in North Dakota.[20] A sister site, planned prior to the SALT

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[18] Coon, ibid., p. 40.

[19] Many of these studies are available through the Office of Economic Adjustment (OEA), DoD.

[20] Office of Economic Adjustment, Status Report on the Economic Adjustment Program in North Central Montana (Washington, D.C., DoD, November 1972).

negotiations, was to be established in rural Montana. Construction of the site was begun in 1970 only to be slated for shut-down in mid-1972 with construction about 10 percent completed. While this level of completion might not appear to be significant, and though there were few government personnel involved, several important points can be noted. First, considerable federal impacted area funding was advanced. Over $3.2 million were expended in the affected communities as the construction of the site was on-going. These monies were spent on schools, public facilities, roads, etc., in anticipation of the influx of both construction workers and, later, the staff of the site. Second, the effects of the May 1972 closing announcement on area employment were both swift and significant. [See Table 1].[21] Third, the effect on local businesses was more than minimal. For example, local motels and hotels were hard hit; "[one] Great Falls concern was left with $1.5 million worth of construction equipment spare parts;"[22] and three bus lines suspended service. Finally, the report noted that land values dropped abruptly.

Table 1

Unemployment Rate for the Impact Area
(percent of work force)

County	May 1972	June 1972	July 1972
Liberty	3.7	9.0	7.4
Pondera	5.6	10.2	8.1
Teton	4.5	9.1	7.5
Toole	5.7	9.7	7.2

[21] OEA, Montana, op. cit., p. 20.

[22] OEA, Montana, ibid.

The OEA has done numerous impact studies applying directly to the question of the effects of base closures. For the most part, these studies have been general case studies. This approach is valuable in that it affords the researcher an opportunity to identify the particular kinds of stress placed on communities by base openings and closings. In so doing, case studies provide valuable insights into how communities are affected by government installations. Unfortunately, beyond indicating areas of stress, the individual case study or site-specific approach provides little foundation for empirical comparison between individual communities and does not provide in and of themselves a methodological approach to abstract quantitative measurements of installation impact.[23]

b. Economic Base Studies

Economic base theory asserts that "a stable relation exists between export and service employment ... so that changes in export jobs will lead to predictable changes in service jobs and in total employment."[24] Export activities are those classified as being exogenously determined while non-export ("local" or "service") activities are endogenous to the local economy. Generally speaking, it is hypothesized that there is a directly proportional relationship between the expansion or contraction of export activities and the amount by which total employment, income, and other economic variables expand or contract. As the export sector expands, it is assumed that the need for local activities (e.g., services and construction) must also increase proportionally to support the export sector. This hypothesis has been the basis of several studies dealing with the impact of military installations or military purchases of goods and services.

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[23]While most of the studies undertaken by OEA are case-specific, some have employed somewhat more sophisticated methodological techniques. One such study is examined below.

[24]Steven J. Weiss and Edwin C. Gooding, "Estimation of Differential Employment Multipliers in a Small Regional Economy," Land Economics, Volume XLIV, No. 2 (May 1968), p. 235.

One early study employing economic base theory was done for the Economic Research Center at the University of Hawaii by Kyohei Sasaki.[25] As might be expected, one of the most serious difficulties encountered when attempting to apply economic base analysis is that of correctly defining and identifying "export" and "non-export" industries. Sasaki, in examining the effect of the presence of military personnel stationed in the state on Hawaii's total employment, separated export oriented and locally oriented employment using several methods, depending on data availability. Where data were available concerning the state's imports and exports, industry employment engaged in export was estimated by the ratio of the value of exports to total value of output of the industry. Where such data were not available, the determination of export/import employment was obtained by comparing the ratio of employment in an industry to total population for Hawaiian economy to a similar ratio determined for the United States. Where Hawaii's ratio was larger than the U.S. ratio, the fraction by which the state exceeded the U.S. ratio was considered export oriented.[26] Local

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[25] Kyohei Sasaki, "Military Expenditures and the Employment Multiplier in Hawaii," Review of Economics and Statistics, Volume XLV, No. 3 (August 1963).

[26] The use of this method of disaggregating types of employment is discussed more thoroughly below.

and federal government expenditures were considered locally oriented and export oriented, respectively, by scholarly fiat.[27]

Sasaki's local employment multiplier is estimated by assuming that local employment is a linear function of total employment (lagged over three time periods) and export oriented employment. The coefficients of the total employment variables suggested a random effect on local employment.[28] By eliminating the total employment variables, he obtained a highly significant correlation between local and export oriented employment. The multiplier for the export employment impact was estimated to be .28; that is, an increase of 100 employees in the defense sector would increase local employment in Hawaii by 28. An interesting question explored by Sasaki related to the difference between the effect of the defense payroll and the effect of military purchases in the wholesale and construction sectors. He demonstrated that the difference "between the total employment effect (consisting of the purchasing and payroll effect) and the employment

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[27]Other researchers have followed different guidelines in handling the export/import definitional problem. For example, Charles Garrison, in a study employing economic base methodology (but which did not relate to the question of military installation impact), substituted personal income for employment in determining the economic base. See Charles B. Garrison, "The Impact of New Industry: An Application of the Economic Base Multiplier to Small Rural Areas," Land Economics, Vol. XLVIII, No. 4 (November 1972), pp. 329-337. The explicit assumption made by Garrison is that employment might not be the most sensitive indicator of economic activity. He explains that, since transfer payments might well be an important source of spending power in some smaller communities, employment and income can move in opposite directions. That is, a loss in income accompanying the loss of employment might be offset, either partially or fully, by subsequent government transfer payments in the form of unemployment compensation or welfare payments.

[28]Sasaki suggested that six-month lags would be more appropriate, but data for testing this hypothesis were lacking.

effect consisting of only the payroll effect was negligible,"[29] implying, then, that the purchasing effect is negligible.

Sasaki's study provides a useful basis for comparing later attempts to quantify the impact of a military installation. In particular, researchers Weiss and Gooding[30] expanded the Sasaki study to include an analysis of the differential effects of private and military exports. Further, their study supported Sasaki's hypothesis that adjustment lags exist. Most important, however, from a methodological standpoint, their study utilized a valuable tool, the locational quotient.

Location quotients are employed in regional economics as a short cut (in the absence of other data) to handle the aforementioned problem of defining service and export employment. The location quotient (LQ) is defined as:

$$\frac{E_i/E}{N_i/N}$$

where E_1 = number of employees in industry i in a local area

E = number of total employees in the local area

N_i = number of employees in industry i in a benchmark area (typically the nation)

N = number of total employees in the benchmark area

It should be noted that this is the approach used by Sasaki in disaggregating export and import industries where import/export data were unavailable.

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[29] Sasaki, op. cit., p. 303.

[30] Steven J. Weiss and Edwin C. Gooding, "Estimation of Differential Employment Multipliers in a Small Regional Economy," Land Economics, Vol. XLIV, No. 2 (May 1968), p. 235.

Location quotients are useful in identifying basic (or export industries) and, to an extent, quantifying employment in these industries.[31] If it can be assumed that a "typical" community economy is "a microcosm of the national economy," a location quotient value greater than one would indicate greater than usual specialization in that industry or activity than would otherwise be expected. If it can further be assumed that an activity with a LQ of greater than one is producing goods and services which are surplus to the needs of community, then these goods and services can be considered to be exports which promote a flow of income into the community. Further, it is possible to estimate employment in basic industries, since "the size of the LQ can be used to make a pro ratio estimate of basic employment"[32] in each activity in the community.

In the Weiss and Gooding study, jobs at military installations were classified as export-related while certain non-manufacturing jobs were classified as service-related using a prior considerations. Location quotients were employed in the "grey area" of the manufacturing sector where such intuitive selection is not theoretically acceptable. The study was undertaken for the Portsmouth, New Hampshire area. Total employment was disaggregated and used to develop multipliers for civilian employment at the Portsmouth Naval Shipyard, for military and civilian employment at Pease Air Force Base, and for private export employment. (The two federal installations accounted for about 25 percent of the area's export base). Further, based on Sasaki's suggestion to lag the export employment variables, but similarly lacking adequate data, Weiss and Gooding constructed an artificial six-month lead for the dependent variable (service employment). With a sample size of 11 representing annual data for 11 years, a time-series regression was performed. The results were as follows:

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[31] The subsequent discussion is drawn from the work of Roger Leigh, "The Use of Location Quotients in Urban Economic Base Studies," Land Economics, Vol. XLVI, No. 2 (May 1970).

[32] Leigh, ibid., p. 202.

Category	Multiplier
Private export employment	1.8
Civilian employment at naval yard	1.6
Total employment at Pease Air Force Base	1.4

Intuitively, the numerical ordering of the multipliers makes sense as private exports relate more directly to the local economy compared to a military installation, which tends to be isolated from the local community.

Still another economic base analysis study, which incorporates some of the variables initially postulated as having significant empirical interest to the researcher, should be mentioned. This study was conducted by John Lynch[33] in the late sixties. Its purpose was to present a quantitative analysis of the economic effects of a base closing on a community. His study is one of the most complete extant in the literature and is, perhaps, the most reliable. He constructed a model aimed at determining the employment multipliers for military installations, but he also examined the impact of military bases on retail sales, housing, and local government finances. Location quotients were utilized in this study, too, but here as estimators of basic employment. The employment effect of a base closing was examined for fifteen communities. As in earlier studies,[34] he found that the multiplier associated with training bases was statistically insignificant. As noted, this is what one might expect considering the lower age and income of the personnel, their lack of dependents, and the military personnel's limited access to off-post facilities.

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[33] John Lynch, op. cit.

[34] Lynch cites Federal Reserve Bank of Boston, "The Economic Impact of a Military Base," New England Business Review (July 1961), p. 2, and Donald I. Terner, The Economic Impact of a Military Installation on the Surrounding Area: A Case Study of Fort Devens and Ayer, Massachusetts, Research Report No. 30 to the Federal Reserve Bank of Boston (Boston, 1965).

Lynch found that the most important variable in terms of employment impact was that of civil service employment. His study suggests that the multiplier associated with this variable is 3.59. It implies that a reduction of 100 civil service positions would result in a total loss of 359 jobs in a community. The impact of a reduction of military personnel is also estimated to be high, i.e., 1.66. Lynch also noted that base employees covered by non-appropriated funding should have been considered in determining the employment effect impact, but that data concerning this group were not available. These employees are paid from funds internal to base activities (e.g., Officers' Club profits), thus making the identification of this class of employee difficult.

Lynch, as noted earlier, also examined the effects of a base closing on retail sales, the housing market, and impacted area funding. With regard to these variables, individual community data were examined with the following qualitative results.

Sales: "The measurable effects of military base closures on local retail sales is at best distorted and confusing. In no other single area is it more difficult to discern the impact of installation closures than on local retail sales."[35] In Lynch's study of 24 base closures, he found that in only seven instances did sales volume fall. Ex ante, one would expect a larger impact. Several factors might account for this unpredicted pattern. First, as has been noted previously, government transfer payments to impacted communities might well buoy local personal income levels. Then, too, Lynch points out the importance of both the lag time between the announcement of closure and the closure date and the proportion of employment on the base relative to the size of the community work force. Where there was little planning time or where base personnel exceeded 15 percent of the total community labor force, there were (with one exception) moderate reductions in sales volumes.

Housing: "The local housing market represents one of the most sensitive economic indicators for any military base closing."[36] However,

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[35]Lynch, op. cit., p. 279.

[36]Lynch, ibid., p. 282.

there are severe data problems associated with analyzing the housing market; as a result the researcher is forced to examine each community separately. Generally, from a sample of eight communities, Lynch found (1) there was a marked shift from private housing sales towards rentals; (2) there were sharp declines in residential values from the time of announcement until actual phase-out was initiated; (3) there was a sharp increase in mortgage foreclosures; and (4) there was "considerable upgrading in housing quality on the part of the remaining population."[37]

Impact area funding: The standards by which federally administered impacted area funding is provided "are so structured that the affected community will actually lose its federal impact assistance at the very time in which the community is really experiencing its more severe federal impact - the loss of its principal employer."[38]

The Lynch study is the best of the studies pertaining to the question of the impact of base closings, and except for the inconclusive nature of the relationship between closings and retail sales, the results are consistent with expectations. It is important to note, though, that "to avoid statistical noise ..., (The Lynch study) has avoided base closures within metropolitan areas."[39] Since metropolitan areas were avoided, the Lynch employment multipliers might be high relative to a multiplier developed with a sample which did include metropolitan areas, as the adverse employment effect may well be dampened in such areas.

It should be noted, in passing, that one of the benchmark studies in the general area of the effects of defense spending on economic activity was done by Roger Bolton in 1966.[40] Bolton developed a regional economic

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[37] Lynch, ibid., p. 288.

[38] Lynch, ibid., p. 293.

[39] Lynch, ibid., p. 10.

[40] Roger E. Bolton, Defense Purchases and Regional Growth (Washington, D.C: The Brookings Institute, 1966).

base model which was designed to analyze defense purchases (in terms of military and government (non-military) wages and estimates of government procurement) as they relate to regional growth. Bolton expressed local income as a linear function of exogenous income, specifically, defense-related income. Most researchers who have employed economic base models acknowledge the Bolton model as a precursor of their own.

Any application of economic base theory raises the question, "Is the theory the best adapted to explaining regional economic behavior?"[41] While much can be said on this subject, its suffices to remark that other regional growth theories, e.g., development stage theory, do not lend themselves as readily to empirical research. More specifically, however, Weiss and Gooding[42] discussed other criticisms levelled at economic base modelling. First, not all service-employment growth is necessarily related to growth in export employment. For example, the growth might be attributable to autonomous investment. Second, there may exist local interindustry linkages in production, as well as interindustry differences in wages and productivity. Third, the important role that a well-diversified service sector plays in regional development is ignored in the structure of the model. They further pointed out, on a much more optimistic note: "The importance of exports to an economy is an inverse function of its size and [therefore] economic base analysis is strongest when applied to small regions."[43] It might well be that the problems noted are damped, the smaller the community. This is because autonomous investment is most likely to be minimal, linkages are less significant and it is "easier to adjust for particular local circumstances."[44]

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[41]Morgan D. Thomas, "The Export Base and Development Stages Theories of Regional Economic Growth: An Appraisal," Land Economics, Vol. XL, No. 4, (November 1964).

[42]Weiss and Gooding, op. cit.

[43]Weiss and Gooding, ibid., p. 237.

[44]Weiss and Gooding, ibid., p. 237.

In addition to these methodological difficulties, there are additional problems associated with economic base analyses which employ location quotients. As Isserman[45] points out, since the location quotient emphasizes net rather than gross estimates, it generally underestimates basic employment. Because of this fact, several researchers have attempted to develop techniques other than local quotients to estimate basic employment.[46] Generally, however, these attempts have proven to be less than totally successful.[47]

c. Input-output Analysis

Many of the limitations of the economic base models can be overcome by input-output (I-O) analysis. The attractiveness of input-output analysis lies in the fact that it yields a comprehensive look at the interrelatedness of the various sectors in an economy rather than simply the relationship between local and export industry employment. The first major application of input-output analysis to the question of the impact of DoD spending was accomplished by Wassily Leontief. This research, as presented in "The Economics of Disarmament,"[48] focused on the nation as a whole, but the author later applied the technique to an inter-industry and interregional model.[49] This latter study aimed at determining the effect

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[45]Andrew M. Isserman, "Regional Employment Multiplier: A New Approach: Comment," Land Economics, Vol. LI, No. 3 (August 1975).

[46]For example, Vijay K. Mathew and Harvey Rosen, "Regional Employment Multiplier: A New Approach," Land Economics, Vol. L, No. 1 (February 1974).

[47]Isserman, op. cit.

[48]Wassily Leontief and Marvin Hoffenberg, "The Economic Effects of Disarmament," Scientific American, April 1961.

[49]Wassily Leontief, et al., "The Economic Impact - Industrial and Regional - of an Arms Cut," The Review of Economics and Statistics, Vol. XLVII, No. 3 (August 1965).

of a hypothetical reduction in military spending accompanied by a "compensating increase in non-military spending," that is, where total employment (in terms of wages and salaries) is held constant. To make the distinction between local and national industries, 66 sectors of the United States were arranged in order of increasing interregional trade of their products; then, these sectors were classified as either local or national. Three distinct rounds of computations were performed, all based on the Leontief national input-output table. In the first round, the impact of the switch from military to non-military spending (demand) was determined for the output of the whole economy; then, a regional apportionment was calculated; finally, the changes incurred at the level of local industries was approximated.

Much more recently, however, input-output analyses has been applied to the question of the role of defense spending in a local economy. V. Howard Savage[50] examined the impact of military installations on the structure of the economy of San Antonio, Texas. This labor market contains several large military installations located within its boundaries. The importance of these installations to the economy of San Antonio is readily apparent when one considers the fact that (between the years 1959 and 1969) the defense-related component for personal income for the area was approximately 25 percent, and that the locational quotient for this element of personal income was about five. No other sector quotient approached this level.[51]

The Savage study also utilized the 66 sector I-O table. An important aspect of the analysis pertained to the treatment of the household sector. If treated as a final demand sector, it is implicitly assumed that household income is maintained irrespective of local defense expenditure changes. If treated as an intermediate sector, the assumption of income maintenance is relaxed.[52] In the latter case, the overall impact will be magnified. This is because the impact of a loss of defense expenditure "is relayed not only

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[50] V. Howard Savage, op. cit.

[51] Savage, ibid., p. 374.

[52] Savage, ibid., p. 377.

through the noted industries, but also through the consumption industries."[53] Savage computed the results both ways.

As would be expected, with the inclusion of the household sector among other final demand sectors, the hypothesized 50 percent change in defense spending produced a minimal change or about 2 percent of the total output of the area. However, when the household sector was treated as an intermediate sector, the changes amounted to approximately 12 percent. Savage computed defense expenditure multipliers for the San Antonio area for both employment and income. With households considered endogenously (so that both the initial and secondary effects of the change in income are examined), the multipliers were 2.06 and 2.00, respectively.

Savage goes on to note that:

> "The development and growth of the expenditures in the area has not exerted backward linkage pressures so as to induce the development of manufacturing and service industries. The pressure has instead come from the household sector of the economy."[54]

Further on, he states that:

> "The total household income change was about 17 percent of total factor income, given a 50 percent decline in federal outlays. Of this change, about 13 percent was wages and salaries and about 4 percent was other factor payments. The largest single category change would be for Department of Defense civilian household income. This change would be about 8 percent of total factor income in the area. Of the remaining categories, services would change most."[55]

These two passages relate to the hypothesis that the presence of an installation affects not only employment and income, but also the structure of the local economy.

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[53] Savage, ibid., p. 375.

[54] Savage, ibid., p. 378.

[55] Savage, ibid., p. 378.

A final I-O study to be mentioned is a Battelle Institute study undertaken under contract to OEA which examined the effects of the 1975 realignment of the Badger Army Ammunition Plant in south-central Wisconsin.[56] The plant employed both government (military and civilian) and civilian contract employees. Battelle, utilizing 1973 data, forecasted a loss of $78 million in total economic activity in the two counties examined, representing a 5.5 percent decrease in the gross regional product. The I-O analysis yielded both an income multiplier and an employment multiplier; they are respectively 1.27 and 1.23. The activities projected to be the most severely affected are listed in Table 2 below.[57]

Table 2

Sector	Loss in Regional Output (in millions)
Railroads and related services	$7.6
Motor freight and warehousing	5.6
Wholesale and retail trade	4.5
Food and kindred products	3.1
New construction, residential	1.7
Finance and insurance	1.7
Real estate and rental	1.4

These figures suggest that the effect of an installation upon local economic sectors is varied and that an installation tends to impact most heavily on local utilities and services. But the study also noted that the ammunition plant also affected the local manufacturing sector. "The most likely impacts include wage differentials, a draining of the available labor supply, and general employment instability. (The plant employed

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[56] OEA, Economic Adjustment Program, Sauk County, Wisconsin (Washington, D.C., DoD, October 1975).

[57] Ibid., p. 47.

5,300 workers in 1969 and 970 in 1975.) These impacts may inhibit, to some degree, the ability of a region to attract industrial prospects."[58] It seems, then, that though some local sectors are particularly affected by the presence of an installation, other aspects of local economic activity are involved, too.

Input-output analysis is more comprehensive that any other methodology thus far discussed. But, because prices are assumed to be constant, factor and product substitution are ignored. Then, too, because of the static nature of the modelling, it is impossible to incorporate offsetting factors, such as DoD reemployment programs or government transfer payments. However, a major and in most cases prohibitive obstacle in the use of I-O is the dirth of an adequate data base. This is a primary reason why input-output analysis for regions is so seldom performed, even with its descriptive advantage. Savage's study is an exception because, apparently, the Bureau of Business Research at the University of Texas has been collecting pertinent data for some years now and has been applying this data base to other similar investigations.[59] While some researchers[60] have suggested modifications of the basic input-output table to reduce the volume of data necessary, these hybrids, undoubtedly, still require a much larger data base than the economic base approach.

d. Cost benefit analysis

A method that has been suggested in some of the literature, but has yet to be implemented to any great extent, is cost benefit analysis.

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[58] OEA, ibid., p. 47.

[59] For example, Robert Williamson, The Lower Rio Grande Valley of Texas: Economic Resources and Growth Prospects in 1983-84 (Austin, Texas: Bureau of Business Research, The University of Texas, Area Economic Survey, 1966).

[60] Robert Williamson, "Simple Input-Output Models for Area Economic Analysis," Land Economics, Vol. XLVI, No. 3 (August 1970).

To illustrate this approach, we note a House of Representatives select committee citation of a study conducted by the Boise-Cascade Center for Community Development.[61] The Center examined the relative costs and benefits of several diverse economic activities, from shopping centers to federal government installations. The report of the committee summarized the scope of the study. "The study took into account the costs to the county government of providing services to the employee of various firms in each of the (thirteen) categories studies, as well as the costs of providing services to the firms themselves." The benefits were considered to be the tax revenue received by county government from both the firms and their employees. The study pointed out that, in being tax exempt and even including impacted area funding provided by the federal government to compensate the county for the lost revenue, the revenues were "not nearly comparable to what would be received from a similar private employer."[62] In this very limited application of the cost benefit approach, it was determined that the benefit/cost ratio for federal installations, which include military installations, was .69. That is, for every dollar of "cost," there is a return of $0.69 in "benefits" for the county.

Cost benefit analysis as a methodology appears appealing in that the conclusions are so straightforward. However, its applicability is limited to one or two variable models. More importantly, it is of limited applicability, for examining effects of military installations on employment and personnel income.

e. "Common Sense" Indicators

Brief mention should be given to another approach to the problem of analyzing the interaction between military installations and their

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[61] The study, "The Impact of Federal Installations on Small Business," appears in the U.S. House of Representatives record, Vol. I, 92nd Congress, p. A105.

[62] Boise-Cascade, ibid., p. 3.

satellite communities, this being the development of qualitative-quantitative indicators. Considered in the light of methodological and data base difficulties mentioned earlier, these types of indicators recommend themselves for their relative simplicity and potential utility.

The National Planning Association,[63] under contract to the Arms Control and Disarmament Agency, developed a community information system. Briefly, this system was designed to provide a compendium of 150 economic variables, e.g., the unemployment rate, tax receipts per capita or retail sales per capita, which could be applicable very generally in assessing a community's economic base. A community's sensitivity and potential ability to adjust to changes to defense sector expenditures could then be evaluated. Sensitivity was measured as very significant, moderately significant, or not significant; potential was measured as high, moderate, or low. The system was not designed to interpret quantitatively the effects of changes in defense expenditures but rather to assist community leaders in identifying potential problem areas and to formulate suitable policy alternatives. As far as is known, however, the NPA's information system has not been implemented or evaluated.

More recently, Ben-Chieh Liu[64] developed composite indicators which rank a county, relative to all other counties in a state in terms of their economic base. These indicators included population, total employment, and the wage levels in the primary, secondary, and tertiary industries in the county. Based on these indicators, counties were then ranked and labelled excellent, above average, below average, or limited. He went on further to develop comparative indicators, based on three locational quotients and four macro-variables which indicated the comparative industrial share and the comparative economic structure of the county relative to the state. The

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[63] National Planning Association, Community Information System (Washington, D.C.: Arms Control and Disarmament Agency, July 1967).

[64] Ben Chieh Liu, "Economic Base and Economic Structure Growth: Quantitative and Qualitative Measures," Land Economics, Vol. L, No. 3 (August 1974).

counties were ranked again and rated as previously described, i.e., excellent, above average, below average, and limited. Ben-Chieh has suggested that the methodology can be extremely useful as a screening device, a "useful first step in location analyses, trade area definition, resource allocation policies, and the like."[65] As long as this methodology is utilized in this limited fashion, this may be so. This approach, however, also remains to be implemented.

3. Summary of Results

While the previous discussion of methodology examines some of the pertinent results of some studies, pertaining to the effects of military expenditures, it is worthwhile to step back and summarize our findings concerning the impact of military bases on employment, personal income, retail sales, housing, and local government fiscal affairs.

Table 3 represents the results of some of the studies mentioned earlier that have been undertaken to analyze the employment impact of installation realignment on local areas. In some respects the estimates are reasonably consistent among those studied.[66] It appears that military installations do have a significant impact on an area's employment, particularly when civilian government employees are included. For example, using the Savage multiplier representing a combined military and civilian employment multiplier, the loss of 100 military and government civilian jobs would result in an additional loss of about 200 jobs in service (local) employment in the San Antonio area, ceteris paribus. We know, further, that there is very rapid adjustment in service employment following a change in Defense Department spending (a base closure, for example), at least as rapid as the six-month lags imputed in the Lynch and the Weiss and Gooding models.

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[65] Ben-Chieh, ibid., p. 300.

[66] The variations can be understood in terms of differing economic climates among the communities, the relative sizes of the bases and the nearby communities and, importantly, the differing scope and arms of the studies themselves.

Table 3

Employment Multipliers for Small Regions/Communities

Researcher	Combined Military and Civilian	Military	Civilian
Savage (San Antonio, Tex.)	2.06		3.59
Lynch	2.2*	1.7	
Weiss and Gooding (Portsmouth, N.H.)	1.4		
Laben**[67]	1.4		
Terner** (Ft. Devens, Mass.)[68]	1.2		
Callen** (Ft. Detrick, Md.)[69]	1.4		
Karns**[70] (Ent. AFB, Colo.)		1.7	
(USAFA, Colo.)		1.6	1.8
(Ft. Carson, Colo.)		1.0	
OEA (Sauk County, Wisc.)	1.23		

*Imputed by Savage on the basis of Lynch's data.[71]
**Cited by Lynch (Table 18-2, p. 272). Because these studies were not available, they could not be examined.

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[67]Lawrence E. Laben, "The Economic Impact of a Defense Installation Upon the Surrounding Community." M.A. thesis, Massachusetts Institute of Technology, Cambridge, Mass., 1961.

[68]Donald Ian Terner, The Economic Impact of a Military Installation on the Surrounding Area: A Case Study of Fort Devens and Ayer, Massachusetts, Research Report No. 30 to the Federal Reserve Bank of Boston (Boston, 1965).

[69]Paul C. Callen, "Economic Impact of Fort Detrick on Frederick, Maryland," M.A. thesis, University of Maryland and Institute for Defense Analyses, Washington, D.C., 1967, p. 40.

[70]James M. L. Karns, An Intertemporal Analysis of the Defense Impact upon a Local Community: Case Study of El Paso County, Colorado (Colorado Springs, 1968), p. 234.

[71]Savage, op. cit., p. 378.

But while the effect of military installations on local employment has been studied by a number of researchers, the effect of a military base on a community's personal income is less well known. Savage has estimated an income multiplier of 2.0.[72] The OEA study estimated the income multiplier for the Badger AAP to be 1.3.[73] However, this research has uncovered no other personal income multipliers with which to compare these estimates. The closest comparison is found in Lynch who noted "it has been found in this study that total personal income, for the very few base closure communities where reliable income data were available, did not react as rapidly to the base closure phenomena as local employment."[74] On this ground, Lynch discounted the use of personal income as the most appropriate indicator of economic activity. So, while the community's personal income levels can be depressed by a base closure, personal income is not as volatile as employment in these communities.

A third factor which has been examined in the literature is the effect of military installations on retail and wholesale sales. A military installation usually employs both military and civilian personnel. Typically, purchases for goods and services by the military and their dependents are concentrated on the base itself -- "estimates range between one-third and one-half of (their) total purchases" are made on post."[75] This may be one explanation for the lack of a quantitative relationship between the level of retail sales and the presence or closing of a military installation. But the "lack of any meaningful relationship between military base closures and the level of retail sales cannot be ascribed" strictly to military spending patterns. Even communities with a large number of civilian Department of Defense employees do not exhibit any strong correlation between base presence

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[72] Savage, op. cit., p. 376.

[73] OEA, Wisconsin, op. cit., p. 46.

[74] Lynch, op. cit., p. 264.

[75] Daicoff, op. cit., p. 308.

or closing and retail sales.[76] Further, it must be remembered that the relationship between personal income and a base closing has not been made clear. Since personal income is a significant determinant of retail spending, it might indeed be true that reemployment policies and financial assistance by state and federal governments offset the income "distress" experienced by the community in the event of a closure. However, there is some sparse evidence that an installation opening might well have a significant impact on retail sales; for example, Nekoma, N.D. experienced a near 1,000 percent jump in retail sales concurrent with the opening of the Army Safeguard site nearby.[77]

At the wholesale level, the picture is mixed. Sasaki found the purchasing effect (military expenditures on goods and services) as being negligible,[78] at least to its effect on employment for a state wide economy. Further, Lynch notes that for the areas he studied only a slight proportion of a base's operating budget, from 4.2 to 4.9 percent, is expended in the adjoining community. But it is the relative size of the operating budget to the size of the community's wholesale market which has to be considered. As Gorgol pointed out, "We found one company with a contract for $313,000 to supply ice cream to Fort Dix (New Jersey). Two other companies received contracts for $3.3 million to supply milk and dairy products for local military establishments."[79] As Daicoff summed up the effect of local retail/wholesale sales, "though not often a major economic addition to the community, the bases' local purchases coupled with the influence of the private purchases made by military personnel can serve to significantly buoy the local economy."[80]

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[76] Lynch, op. cit., p. 280.

[77] Coons, et al., op. cit.

[78] Sasaki, op. cit., p. 303.

[79] John F. Gorgol, "The Economic Effects of Military Procurement in New Jersey" in Melman, Seymour (ed.), The Defense Economy (New York: Praeger Publishers, 1970.

[80] Daicoff, op. cit., p. 309.

The effect of a military installation on the local housing market appears to be stronger than one might expect. While it is true that the majority of U.S. military installations provide on-site housing for some or most of its personnel, Lynch found that the "local housing market represents one of the most sensitive economic indicators for any military base closing."[81] It should be pointed out that the housing market as a whole is usually highly price inelastic, particularly with a military base nearby. In the latter situation, the accompanying high personnel turnover rate, relative to other communities, implies a more than usually large demand for housing rentals and sales. Also, it is likely that property values are supported by the presence of a military installation so that when a base closes, the housing market (often overbuilt in times of a build-up of personnel strength as in the sixties) is deluged with sellers. Defaults on mortgages, while they have not been thoroughly analyzed, are likely to increase. Daicoff noted in his 1965 study that particularly hard hit was low-cost housing, probably utilized by lower ranking personnel without housing priority or transient personnel ineligible for post housing.

Finally, while there has been little research on the fiscal impact on the community by a military installation, the Boise-Cascade benefit cost study pointed out that in being tax exempt (and even including impacted area funds provided by the federal government to compensate local government) the revenues from government activities "are not nearly comparable to what would be received from a similar private employer."[82] In this very limited application of the cost benefit approach, it was determined that the benefit/cost ratio for all federal government installations, not just military installations was .69, i.e., for every dollar of "cost" there is a return of $0.69 in benefits for the county. This implies that gains in earnings are partially offset in the form of increased taxes to support federal installations.

It appears, then, from this brief synopsis of research results, that the presence of a military installation does stimulate local employment,

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[81] Lynch, op. cit., p. 282.

[82] U.S. Congress, House Select Committee on Small Business, op. cit. p. 4.

particularly in the service sector, and the multiplier effect is relatively significant.[83] The effect of a base on community personal income is also positive. Additionally, housing market and land values are supported by a base's presence. While one would expect that installation purchases at the retail and wholesale level are also an important source of activity in these sectors, the empirical data seem to indicate that the relationship may not be very strong. On the other hand, the presence of an installation appears to pose a fiscal hardship on local communities, one only partially offset by federal government transfer payments. It is also possible, but yet to be demonstrated, that the presence of government installations inhibits the diversification of the economic base of the local areas. On the whole, the evidence from these studies supports the view that base openings and closings do have an important impact on local community growth.

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[83] Recent examination of communities containing installations which have been closed or whose operations have been cut back significantly in the early 1970's suggests that the multipliers shown in Table 1 may be somewhat high. However, data are still to be collected concerning these communities and the results have not been thoroughly examined. (Based on a conversation with Dr. John Lynch, Office of Economic Adjustment, DoD, Feb. 10, 1976.)

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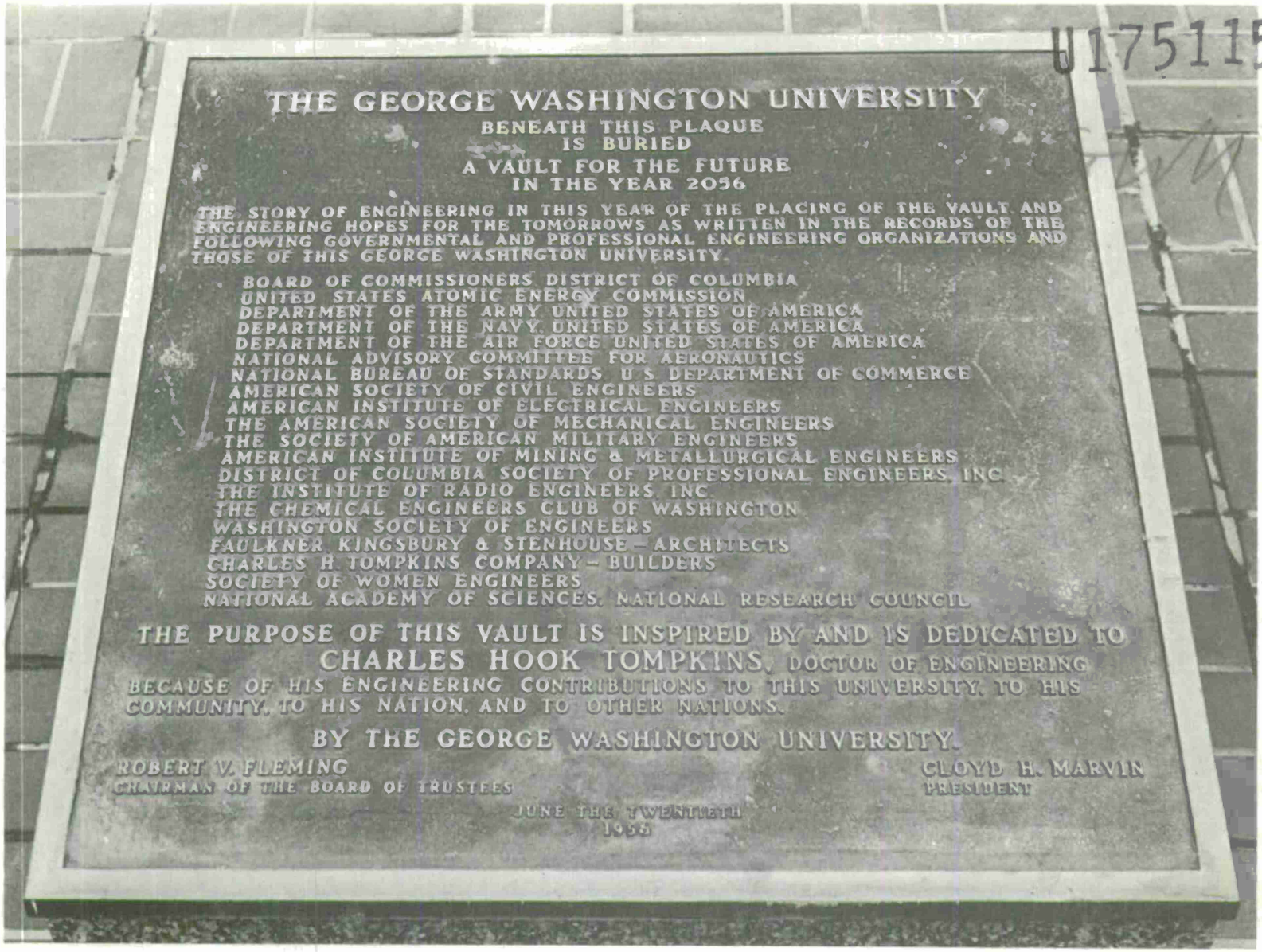

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