

North Carolina Statewide Military Impact Study

**Prepared for
North Carolina Advisory Commission on Military Affairs**

**Prepared by
East Carolina University Regional Development Services
&
Regional Economic Models, Inc.**

**in Cooperation with
NCSU Economic Development Partnership**

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Introduction

One of the most significant economic engines in North Carolina is often forgotten when economic development and economic energy issues are discussed. It is often viewed as a solid, supportive part of the state's development picture but frequently ignored in economic development discussions of more conventional industries. The presence of military personnel, the operation of the bases, and the related economic assets brought to the state due to the military are less recognized. Often the jobs and dollars tied directly or indirectly to the military operations and military-based dollars are a second thought.

The reasons for this under-recognized value may be borne out of the military's concentrated presence in one area of the state. This may be due to the lack of industries recognized as "defense industries." The cause may be that the spin-off dollars that follow the military often have not been considered as influenced by the military. Whatever the explanation, the military operations, military contracts, and the role of military retirement benefits combined should be recognized as one of North Carolina's most important sources of economic activities.

This work was requested by the North Carolina Advisory Commission on Military Affairs for the expressed purpose to attempt to quantify the combined economic importance of the military in North Carolina. This work was initiated in mid 2003 and sought to update a similar project accomplished in the mid 1990s. The NC Statewide Military Impact Study pulls together as many of the economic contributions that can be seen as military-based or military-influenced.

Project Background

In recent weeks, the initial steps in another round of military assessments by the Base Realignment and Closing Commission (BRAC) have commenced. It is anticipated that the next series of BRAC recommendations will occur during the latter part of 2005. The ramifications of these recommendations could be far-reaching if any of the bases in North Carolina are affected.

It is necessary for North Carolinians and North Carolina public officials to be fully apprised of the economic contributions of the military dollars as these deliberations approach.

Study Methodology

To measure the economic impact the scope and process of the study were determined and put into action. It was decided that the Regional Development Services of East Carolina University and personnel from North Carolina State University would provide the study with the personnel to gather the information. Regional Economic Models, Inc.(REM) of Amherst, Massachusetts was contracted to execute the type of modeling allowing the work to be as comprehensive and accurate as possible for the amount of dollars and economic interactions that take place statewide.

The breadth of the study includes as much of the following information as could be collected and assimilated in the form that REMI needed to provide the information as requested. The components included:

- military operation expenditure profile by 2-digit SIC (Standard Industrialization Codes)
- military personnel payrolls
- civilian personnel payrolls
- military contractual expenditures
- military retiree benefits
- veteran of the military benefits
- associated capital expenditures
- DOD contract expenditures by 2-digit SIC (Standard Industrialization Codes)

The military operations that were part of the final analysis are those bases under the budget management of the Department of Defense and include:

- Camp Lejeune Marine Corps Base & New River Air Station – Onslow County
- Cherry Point Marine Corps Air Station – Craven County
- Fort Bragg Army Base & Pope Air Force Base – Cumberland County
- Seymour Johnson Air Force Base – Wayne County

Also, the operation and expenditures of Sunny Point Marine Terminal in Brunswick County and expenditures and operation of the North Carolina National Guard and Air National Guard were collected and factored into portions of the economic projection work. The most readily available data to be used for inclusion in the study are for Fiscal Year 2002.

Based on the level of data needs required by REMI, a survey instrument was devised so that the available expenditure information be categorized by two-digit Standard Industrial Classification codes. This establishes continuity across the board for the information provided by the contact persons. It also allows the information to be fed into the REMI model based on the categories it is designed to determine economic relationships and market interactions in North Carolina.

Primary runs for categorical breakdowns and secondary runs for the military bases and their operations indicate the individual economic strength of the bases for their geographic areas. Since the REMI model is based on and set for statewide economic market interaction, special disaggregation steps for each run were taken for the estimated local influences. Due to the inability of the model to account for local market strengths and weaknesses, these calculations may have some overlap or distortion when trying to fully account for the preciseness of the model's overall projections.

This study recognizes that time and funding do not allow all dollars associated with related subcontract spending to be identified and that estimates of North Carolina dollars spent through military operation budgets are very difficult to isolate or categorize. Time did not permit us to insure that the interpretations of the business categories be consistent

from base to base. The information provides a concentrated effort to establish the best projection yet for the contribution of military dollars to North Carolina's economy.

Major Findings

Gross State Product

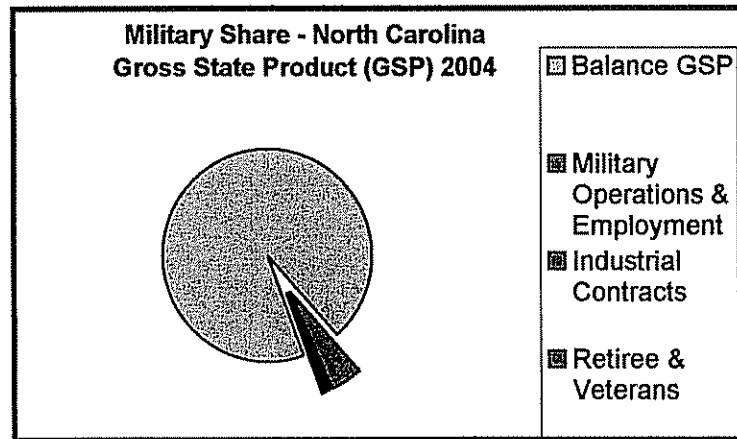
Based on the projections of the gross state product of NC, the contribution of all aspects of the military dollars spent exceeds 7% of GSP—**\$18 billion**. (See Figure 1.)

Approximately 70%, or \$12 Billion is contributed to that total by the primary military bases through

- the operations of the bases
- associated purchases
- payroll of military & civilian employees

Department of Defense contracts and retiree payments account for another \$1.43 billion and \$1.51 billion respectively to the total.

Figure 1

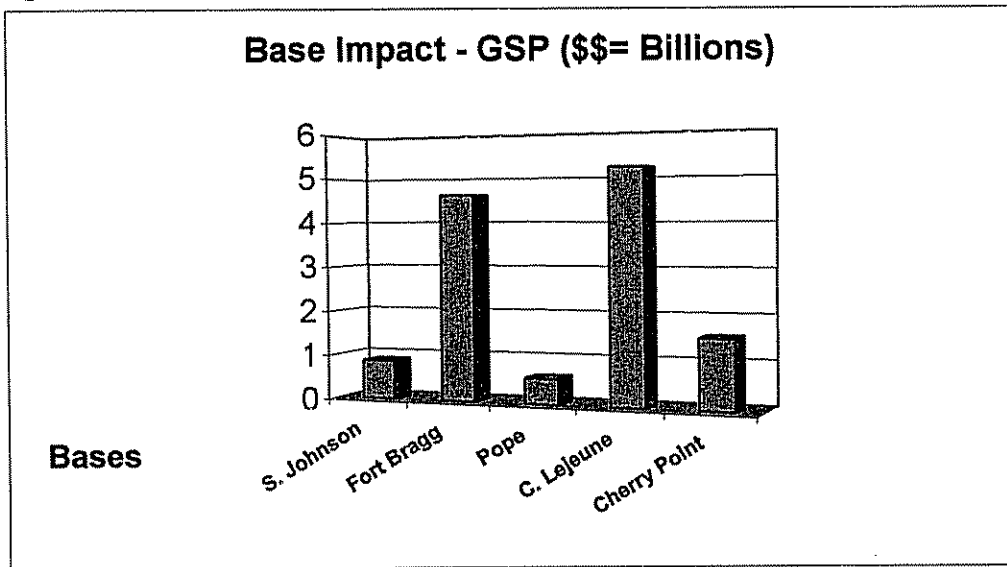


The \$12 billion contributed to the Gross State Product by the major military bases includes:

- over \$5 billion by Camp Lejeune
- \$4.7 billion by the Fort Bragg & Pope Air Force Base
- \$1.5 billion by Cherry Point
- \$0.8 billion by Seymour Johnson

(See Figure 2.)

Figure 2



Employment

Actual contribution to the employment picture of North Carolina is also very dramatic; over **333,000 persons** have some link to the military or the economic stimulation it exudes. Of the 333,000 persons, nearly 262,000 are projected as directly related to military operations, and approximately 60,000 persons are contributable to industrial contracts and the dollars flowing into NC for retirement payments to military personnel.

The base impacted employment runs from over 90,000 persons in the Camp Lejeune area to almost 83,000 persons in the Fort Bragg and Pope area. Cherry Point's projected contribution to the employment picture is nearly 30,000 persons, and Seymour Johnson affects nearly 15,000 employees.

Labor Force

The labor force (non-military) is also greatly affected by the economic impact of military dollars. **Nearly 84,000 jobs** are stimulated by the economic activity associated with military spending in various ways. Over 80% of this total is the operation and expenditures associated with the military bases in North Carolina. The remaining 20% (16,000) jobs are related to retirees and the contracts that the Department of Defense have in place in 77 of NC's counties. Over 42,000 persons in the labor force are influenced in the Camp Lejeune and Fort Bragg/Pope labor markets.

Income

The real disposable income and personal income have significant impact by the military and their dollars. Almost **\$13 billion (12.89%)** in **personal income** is gained in NC by economic activities related to the military, its bases, and its personnel.

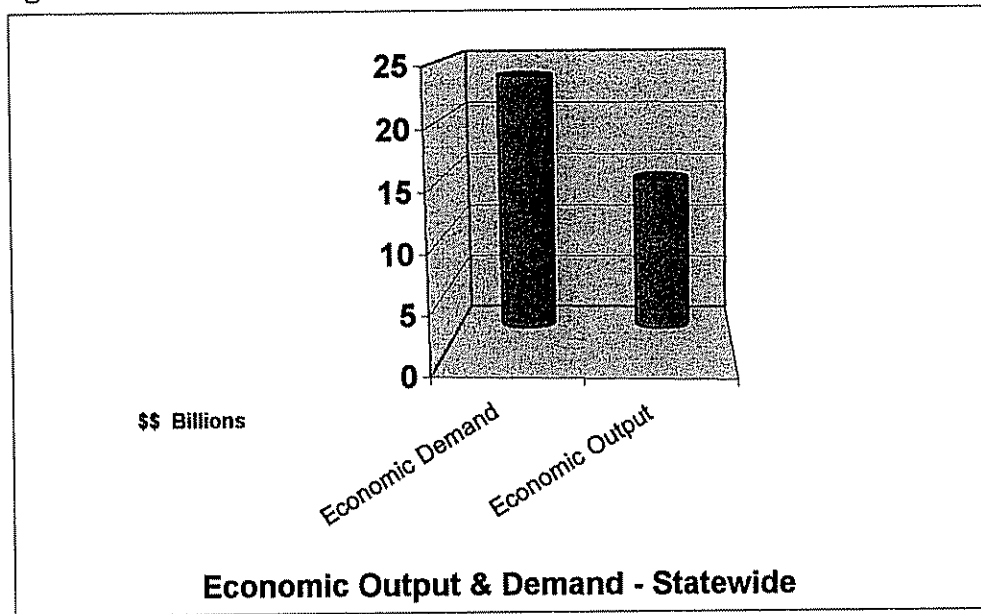
Real disposable income—the primary lifeblood of local economies—exceeds \$10 billion (see Figure 2) related to the various aspects of military spending and stimulus. This is

especially true in the base areas where over \$5 billion in disposable income is created from the operation and payrolls of the bases.

Demand & Output

Industrial activity in NC is accelerated by the many forms of military spending as \$23 billion in demand is created while another almost \$14 billion in output is generated by the dollars and economic demands placed on the economy by the presence of all types of military spending. Just over 57% of the demand dollars are produced from economic activity associated with the military bases—20% by retiree dollars and another 22% by the industrial contracts.

Figure 3



Totals

Figures four and five illustrate the breakdown of major indices and the impact of the military bases in terms of several economic variables:

Figure 4

| Contribution Breakdown | | | | |
|-------------------------------|--|------------------------|-----------------------|----------------------------|
| Breakdown | Contribution to Gross State Product | Employment | Labor Force | Impacted Population |
| TOTAL IMPACT | \$18.07 billion | 320,300 persons | 79,920 persons | 316,700 persons |
| Operations | \$15.07 billion | 261,600 persons | 68,520 persons | 304,500 persons |
| Contracts | \$1.49 billion | 28,350 persons | 5,125 persons | 5,320 persons |
| Retiree, Vets | \$1.51 billion | 30,230 persons | 6,181 persons | 6,571 persons |
| | | | | |
| Camp Lejeune | \$5.2 billion | 91,840 persons | 22,640 persons | 89,390 persons |
| Fort Bragg/Pope | \$4.7 billion | 82,620 persons | 20,710 persons | 84,540 persons |
| Cherry Point | \$1.55 billion | 27,480 persons | 6,150 persons | 19,020 persons |
| Seymour Johnson | \$0.858 billion | 14,900 persons | 3,750 persons | 15,420 persons |

Figure 5

| Income Category Breakdown | | |
|------------------------------------|---|------------------------------|
| Income categories Breakdown | Contribution to Real Disposable Income | Added Personal Income |
| TOTAL IMPACT | \$9.762 billion | \$12.45 billion |
| Military Operations | \$6.846 billion | \$8.865 billion |
| Contracts | \$0.6566 billion | \$0.893 billion |
| Retiree, Vets | \$2.26 billion | \$2.691 billion |
| | | |
| Camp Lejeune/New River | \$2.43 billion | \$3.16 billion |
| Fort Bragg/Pope | \$2.25 billion | \$2.9 billion |
| Cherry Point | \$0.8058 billion | \$1.06 billion |
| Seymour Johnson | \$0.3973 billion | \$.52 billion |

Model Overview

Background

Regional Economic Models, Inc. provided the use of their EDFS-53 model of NC to run aggregate and individual simulations in order to quantify the economic contributions of the military. Data collection was primarily completed by ECU-RDI through contact with the major data resources, while the interpretation and simulation runs were each performed by a REMI staff economist.

Data

Data sets for the simulation runs were gathered from several sources:

- the individual NC bases
- the Department of Defense
- the Office of the Actuary
- the NC National Guard
- the NC Veterans Administration

To quantify the private sector industry impact of the military bases, local expenditures were itemized by industrial sectors. Most of the base expenditures by industry are provided with a percentage attached to each that relates how much of the total expenditure is directed at NC industries. The industry contracts and their industrial/business code were provided by the Department of Defense. Military wages and transfer payments toward retirees also were collected and are included in the analysis. The data are paired with the corresponding policy variables and entered into the model as a reduction from the projected baseline value for NC, in terms of industry output, employment, and transfer payments.

REMI EDFS-53 & Policy Variables

Model Introduction

REMI Policy Insight features the REMI model that has been built especially for the geographic area(s) in a customized version of the model. The model-building system uses hundreds of programs developed over the past two decades to build customized models for each area using data from the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Department of Energy, the Census Bureau and other public sources.

The REMI model is a structural model, meaning that it clearly includes cause-and-effect relationships (see Figure 1). The model shares two key underlying assumptions with mainstream economic theory:

1. *households maximize utility*
2. *producers maximize profits*

Since these assumptions make sense to most people, the model can be understood by intelligent lay people as well as trained economists.

In the REMI model, businesses produce goods to sell to other firms, consumers, investors, governments, and purchasers outside the region. The output is produced using labor, capital, fuel, and intermediate inputs. The demand for labor, capital, and fuel per unit of output depends on their relative costs, since an increase in the price of any one of these inputs leads to substitution away from that input to other inputs. The productivity of labor and intermediate inputs depends on the access to them. The supply of labor in the model depends on the number of people in the population and the proportion of those people who participate in the labor force. Economic migration affects the population size. People will move into an area if the real after-tax wage rates, the likelihood of being employed, and the access to consumer goods increases in a region.

Supply and demand for labor in the model determines the wage rates. These wage rates, along with other prices and productivity, determine the cost of doing business for every industry in the model. An increase in the cost of doing business causes an increase in production costs and the price of the goods or service, which would decrease the share of the domestic and foreign markets supplied by local firms. This market share, combined with the demand previously described, determines the amount of local output. Of course, the model has many other feedbacks; for example, changes in wages and employment impact income and consumption, while economic expansion changes investment, and population growth impacts government spending.

Figure 6

REMI Model Structure (2002 -)

- - - ECONOMIC GEOGRAPHY LINKAGES

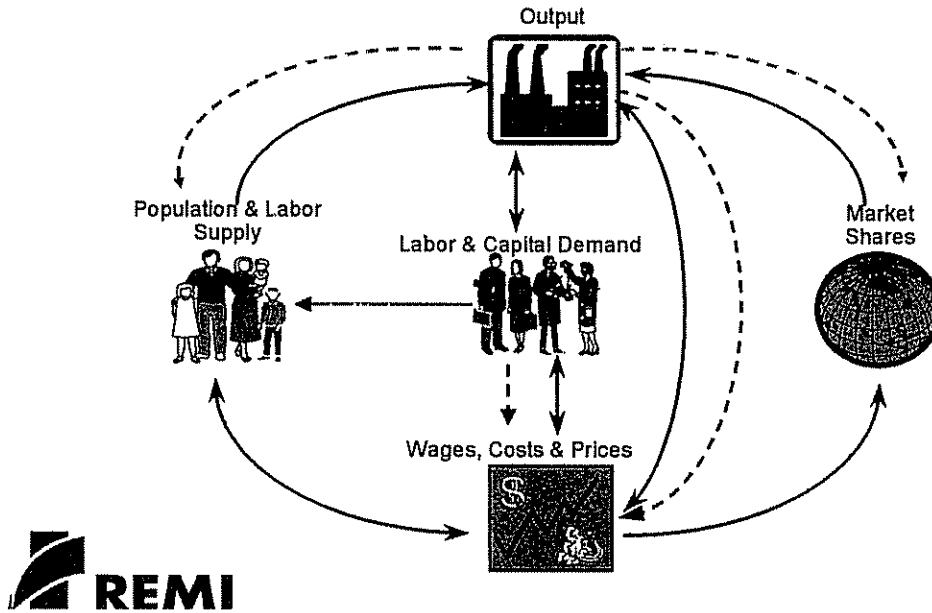


Figure 6 is a pictorial representation of the model. The output block shows a factory that sells to all the sectors of final demand as well as to other industries. The labor and capital demand block shows how labor and capital requirements depend both on output and their relative costs. Population and labor supply are shown as contributing to demand and to wage determination in the product and labor market. The feedback from this market shows that economic migrants respond to labor market conditions. Demand and supply interact in the wage, costs, and prices block. Once costs and prices are established, they determine market shares, which along with components of demand, determine output.

In addition to these linkages, new linkages indicated by the dashed arrows have been added to account for the effects of agglomeration in both the labor and product markets. These effects are crucial to accurately capturing the key to why areas that have a concentration of similar businesses can prosper despite high wages and real estate costs. The reason is by having a choice of suppliers and workers, each firm can obtain specialized labor and inputs that best fulfill its needs. They increase productivity and efficiency. The arrow from the output block to the cost block shows that more suppliers will add to the efficiency of inputs and then reduce productions costs and

competitiveness. The arrow from the labor block shows that more labor will increase the productivity of labor, thus reducing labor costs and thereby making the area more competitive. The arrow from output to the population block shows that the greater output provides more variety of choice and enhances consumer satisfaction, and thus inward migration. The arrow from the output to the shares block shows that the areas with concentration can offer more to purchasers, thus having an effect on market share in addition to the price advantages through the cost and price block.

The REMI model brings together all of the above elements to determine the value of each of the variables in the model for each year in the baseline forecasts. The model includes all the inter-industry relationships that are in an input-output model in the output block, but goes well beyond the input-output model by including the relationships in all of the other blocks shown in Figure 6.

In order to broaden the REMI model in this way, it is necessary to estimate certain key relationships. This is accomplished by using extensive data sets covering all areas in the country. These large data sets and over two decades of research effort enable REMI to simultaneously maintain a theoretically sound model structure and build a model based on all the relevant data available.

The REMI model has strong dynamic properties, which means that it forecasts not only what will happen but also when it will happen. This results in long-term predictions that have general equilibrium properties, meaning the long-term properties of general equilibrium models are preserved without sacrificing the accuracy of event timing predictions and without simply taking elasticity estimates from secondary sources.

Variables

Regional Economic Models, Inc. provides economic models designed to answer policy questions through the use of policy variable selection and forecasting. The model features a baseline forecast that projects economic values out to 2035. When a policy is considered, the magnitude of the impact is very important and is measured by comparing the baseline to post simulation results. Before post simulation results can be compared to the baseline forecast, the user of the model must select certain policy variables. As referenced earlier, the data are organized into three basic categories

1. industry output demand
2. military employment
3. retiree & veterans pay via transfer payments

The policy variables are then selected within the model, connecting the collected data sets to the model's economic structure. The following lists the variables selected and a brief definition of each.

1. **exogenous final demand:** A policy variable used to reflect the decrease in industry demand. Local demand (amount) policy variables change the total demand in the specified industry. For policy variables which affect demand, only the proportion of demand that is usually supplied locally is added to local production. The remainder of the amount that you enter is assumed to be produced elsewhere and imported to the area. These proportions are calculated using the Regional Purchase Coefficient (RPC) which is a measurement of self supply divided by total demand.
2. **military employment:** A variable that allows the user to increase or decrease the number of military employees in a certain region.
3. **federal civilian employment:** A variable that allows the user to increase or decrease the number of federal civilian employees in a certain region.
4. **transfer payments:** A variable that allows the user to increase or decrease the dollar amount of government payments to individuals.

These are the policy variables used in the simulations. All values are entered as reductions against the baseline value and extend out to the last forecasted year. This is because the absence of the military is thought to be permanent for purposes of uniformity and impact.

Simulations

Eight simulations were run with various differences in data inputs and variable selections. Of the eight simulations, four were base specific (disaggregated) with all applicable variables, three were simulations runs of individual variables at NC's aggregated levels, and the final one was with all variables and all base data sets (aggregated).

Results

With the existence of eight individual simulation runs, the table of results varies a great deal because in certain simulations special care and consideration to include and not include certain variables was done to highlight the contributions of the individual bases and components of the military complex.

The simulation results for the individual component run reveal that the largest contributor to NC's economy, in terms of employment and gross state product, is the military employment. In fact, it is safe to say that military employment is a dominant presence in the economy as the impact seen in the private sector shows the extended impact of the military presence. Since most military employees have dependants and these dependants (spouses and/or children) are part of the labor force and hold jobs in the private non-farm sector their extended influence on the economy is felt; however, the effects of the

industrial contracts and the retiree and veteran transfer payments should not be discounted because they are also major contributors to NC's economy. Both account for roughly the same amount of employment (about 30,000 jobs a piece) and the same level of output (about 1.4 billion) in the aggregate, but their individual contributions in detail differ. For example, the impact on the finance, insurance, and real estate sector exemplifies the difference as the contributions of the retiree and veteran transfer pay (\$1.7 billion) is more than twice as much as the contributions of the Industry contracts (\$0.7 billion). This makes sense as the retirees require more banking services (they would be the group with the largest share of residential capital stock per capita) and the effects of the industry contracts on this particular sector are more tied into services demanded by those employed in other industries like services, retail trade, manufacturing, and construction.

The result for the bases is determined by the number of military employees and by the share of expenditures being directed at NC industries. Using the available percentages as reported by the bases, a NC expenditure value was derived and incorporated into the policy variables for exogenous final demand by industry. For industries with high ratio of regional purchases, the industrial contracts play a more prominent part in the economy than those with a low ratio of local purchases since the coefficients reflect the availability of local supply required to meet demand.

Base employment type also affects the results because the mix of federal civilian and military employment seen in the bases lead to different consumption patterns than what is seen if the bases employment were strictly military. The use of part-time public sector employees for specialized base projects is reported by the bases and included in the data sets but is not included in the simulation. The reason for its absence is because these employees aren't actually a part of the military complex and would most likely be hired for a similar job by a non-military entity, resulting in similar levels of output and employment. Also, the lack of detail does not allow these employees to be tied to a certain industry sector, making the data impossible to accurately incorporate.