The Hampton Roads Economy

- Analysis and Strategies -

Part 1: The Role of the Military

April 2004

HAMPTON ROADS
PLANNING DISTRICT COMMISSION

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- Analysis and Strategies -

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INTRODUCTION

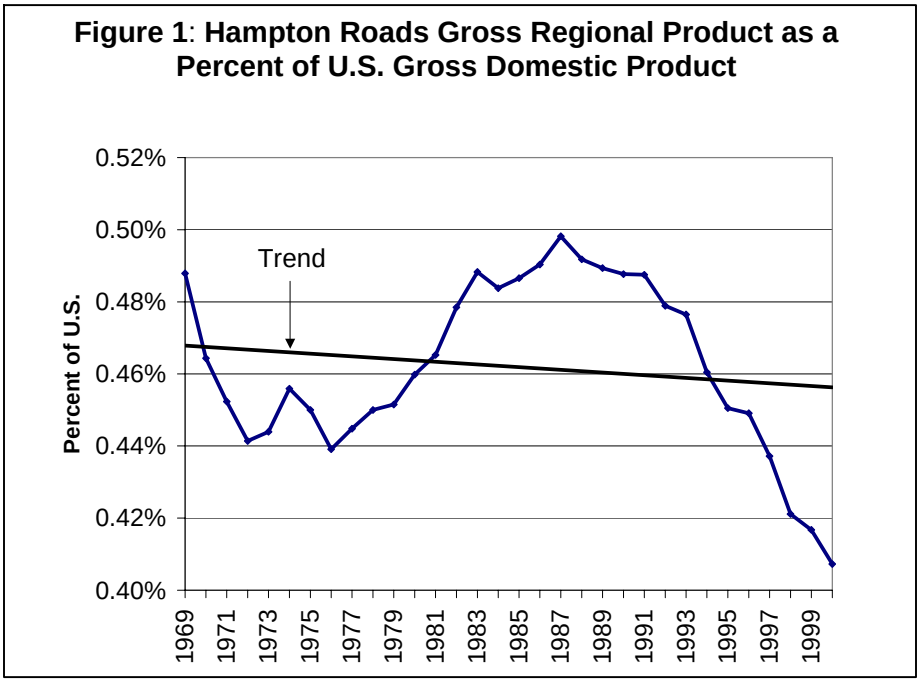
The economy of Hampton Roads has been, and remains, heavily dependent upon the activities of the Department of Defense (DoD). As a result, changes in the level of those activities and their associated expenditures can produce large socio-economic impacts on the Hampton Roads area. This investigation will explore the relationship between variations in defense expenditures in Hampton Roads and variations in regional economic activity. The report will conclude with recommendations as to how the region may best prepare to meet future changes in local defense activities. Special emphasis will be given to the impacts created by changes in the number of military personnel living and working in the region.

HAMPTON ROADS GROWTH CHARACTERISTICS

The Regional Economy

The economy of Hampton Roads grows at rates which are slightly less than those of the nation as a whole. In fact, from 1970 to 2000, U.S. Gross Domestic Product (GDP) expanded in constant dollar terms by 3.2 percent annually as compared to an average annual increase of 2.7 percent in the region's Gross Regional Product (GRP). As a result of the region's slower growth, with the passage of time, the Hampton Roads area has become an ever-smaller share of the nation's economy as can be seen in Figure 1. The close correspondence in the annual growth rates of the two economies is shown in Figure 2.

Figure 1: **Hampton Roads Gross Regional Product as a Percent of U.S. Gross Domestic Product**



Another expression of the relationship between national and regional economic growth is diagrammed in the scatter plot shown in Figure 3. The scatter plot was made by arraying the joint growth experiences of the U.S. and Hampton Roads economies for each of the years from 1970 to 2000. The annual percent change in U.S. GDP is shown on the horizontal axis and annual percent change in Hampton Roads GRP is shown on the vertical axis. Each "dot" or point on the chart indicates the growth experience of the two economies in a single year. A least-squares trend line has been inserted into the chart in an effort to describe the pattern of the points on the chart. That trend line slopes upward to the right indicating that as the U.S. economy grows faster, the Hampton Roads economy grows faster as well. However, the somewhat "shallow" slope of the trend line suggests that

Figure 2: A Comparison of U.S. and Hampton Roads Economic Growth Rates

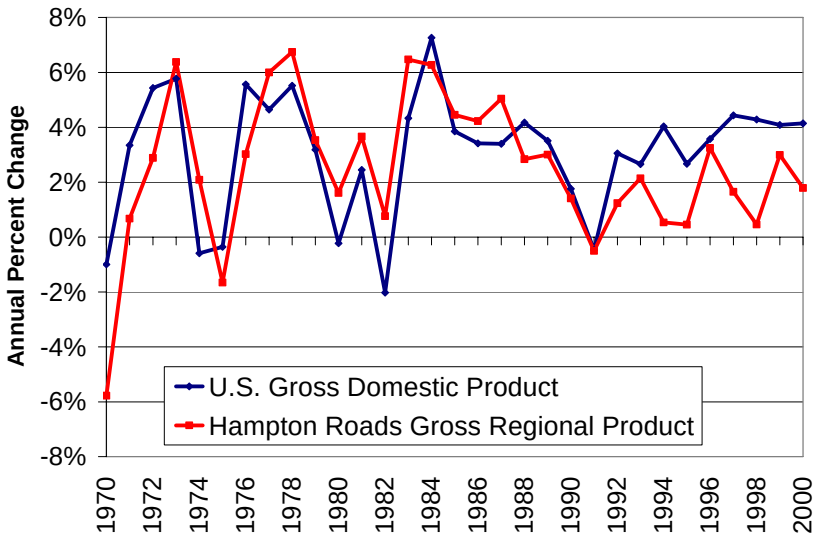
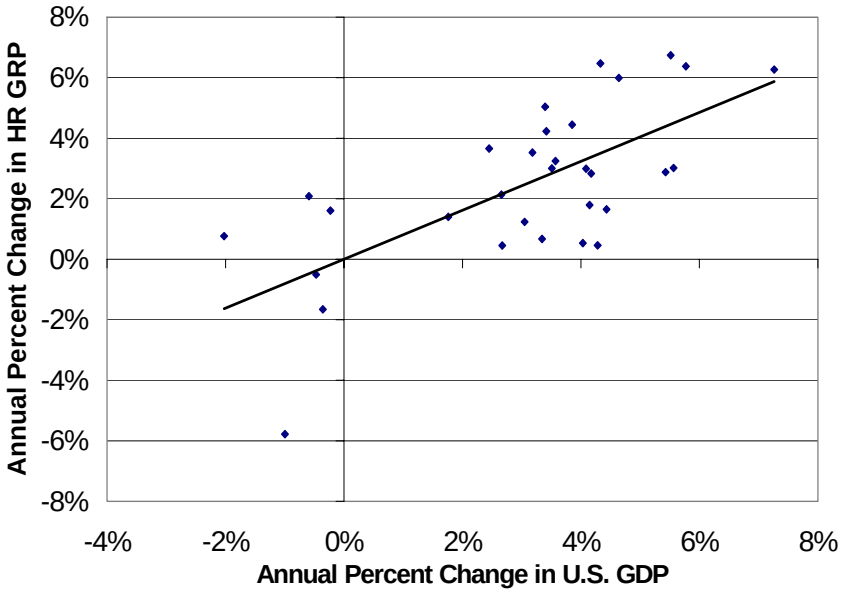


Figure 3: The Relationship Between U.S. and Hampton Roads Economic Growth



faster U.S. economic growth does not produce correspondingly high rates of growth in Hampton Roads. More specifically, each increase in the rate of U.S. growth shown on the horizontal axis produces only a 0.8 percent increase in regional growth measured on the vertical axis.

A somewhat more precise expression of the relationship between local and national growth rates can be achieved through the use of a regression equation, which relates growth in Hampton Roads GRP to growth in U.S. GDP and includes the growth in the region's military employment as well. This equation suggests that a one percent change in military employment in Hampton Roads has historically (1970–2000) produced a one-third percent change in the region's GRP while a one percent change in U.S. GDP produces a nearly 0.8 percent change in GRP. However, these measured relationships appear to be changing since the same equation gives very different results for different calibration periods. For example, if the time period from 1970 to 2000 is separated into two parts with the first being from 1976 to 1987, the period of the last major defense buildup, and the second from 1988 to 2000, the period of the last major defense builddown, the impact of military changes drops from 0.33 to 0.25, i.e., a one percent change in the number of military personnel in Hampton Roads produced a 0.33 percent change in GRP during the 1976 to 1987 period while the same percent change during the 1988 to 2000 period produced only a 0.25 percent change in GRP. In other words, a one percent change in military activity appears to be producing a slightly smaller impact upon the area's economy with the passage of time. This result is not unexpected given that the military's share of the regional economy has been declining for many years.[1]

The influence of the U.S. economy on the regional economy may also be declining since a one percent change in U.S. GDP produced a 0.83 percent change in Hampton Roads GRP in the 1970 to 1985 period while producing a 0.58 percent change in the 1986 to 2000 period. Stated differently, changes in U.S. economic activity have become less meaningful to the regional economy with the passage of time. This result is consistent with the increasing globalization of the region's economy since greater sensitivity to economic conditions in the rest of the world may be diminishing the region's dependence upon the domestic economy. This argument is further supported by the fact that the explanatory power of this simple regional model is lower in the second period than in the first, again suggesting that factors other than the U.S. business and defense cycles, such as global economic activity, are becoming important to the region's economy.

[1] The buildup and builddown dates refer to the national defense cycle – not the defense cycle in Hampton Roads. Dates for the national cycle were used since detailed information over a long period of time on the local defense cycle is not available. The peaks and troughs of the two cycles are believed to correspond very closely since Hampton Roads receives a significant share of the nation's defense expenditures.

Another characteristic of economic performance is the variability or volatility of growth. One expression of regional volatility is the standard deviation of the annual percent change in gross product. Standard deviation is a statistical measure of the variation in a set of numbers.[2] The higher the measured standard deviation, the greater the variations in the collection of numbers being considered. The standard deviation for U.S. and Hampton Roads annual growth over the period from 1970 to 2000 is shown in Table 1. As can be seen in the

Table 1: Comparisons of Economic Stability
1970 to 2000

		Expressions of Regional Economic Stability	
	Compound Annual Percent Change	Standard Deviation of Annual Percent Changes	Coefficient of Variation
Real U.S. GDP	3.21%	2.23%	0.69
Real Hampton Roads GRP	2.73%	2.65%	0.97

table, Hampton Roads has a slightly higher standard deviation than does the U.S. suggesting that the economy in Hampton Roads is less stable and is more volatile than that of the nation as a whole. This result is not unexpected since the national economy has a more diverse set of industries than does Hampton Roads. This tends to add stability to the U.S. economy. The U.S. also benefits from greater geographical and climatic diversification since variations in economic activity in different parts of the nation tend to "cancel" or to partially offset each other to produce greater stability. In fact, regional economies typically are somewhat less stable than the national economy because they have less sector and geographical diversification. The coefficient of variation which is the standard deviation divided by the mean also shows more local volatility when compared to the U.S.[3]

While the Hampton Roads economy is slightly less stable than the nation's economy overall, it experiences much less volatility than do most other MSAs. In fact, using employment data from 1970 to 1999 and the analytical technique

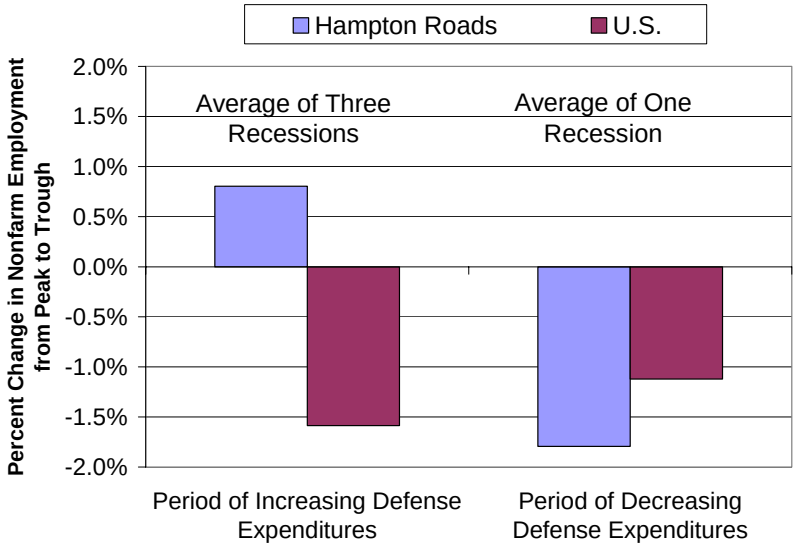
[2] A more precise definition of standard deviation can be found in any beginning textbook on statistics.

[3] The coefficient of variation adjusts the standard deviation for the size of the mean. This adjustment is important since time series comprised of larger numbers frequently have higher standard deviations than a series with smaller numbers. Dividing by the mean scales the standard deviation so that better comparisons can be made between the volatility of time series. This topic is normally covered in beginning textbooks in business and economic statistics.

described above, Hampton Roads was estimated to have had a smaller standard deviation than eighty-nine percent of the nation's metropolitan regions. This high level of stability results from the region's dependence upon the U.S. business cycle as well as the U.S. defense cycle. These two cycles are frequently out of phase with each other so that each cycle has historically tended to "offset" the effect of the other. This has moderated year over year economic changes – especially when comparisons are made with other MSAs. Additionally, recessions in Hampton Roads tend to be milder and of shorter duration than those found in other metropolitan regions because of the offsetting effects of the business and defense cycles.

The insulating effect that defense spending has had on the regional economy can be seen in the employment record of the last four recessions shown in Figure 4. During three of those recessions (1980, 1981-1982, and 2001), defense spending was increasing so that the regional economy performed better than did the nation overall. By contrast, one of those recessions occurred when defense spending was declining (1990–1991) and the regional economy suffered from both the effects of a national business cycle slowdown as well as a reduction in defense expenditures.

Figure 4: Percent Change in Non-Farm Employment from Business Cycle Peak to Business Cycle Trough over the Last Four Recessions 1980 - 2003



The region's employment experience during the last four recessions is summarized in Figure 4. Data in the figure show the percent change in regional and U.S. employment from the peak to the following trough of the U.S. business cycle over the period from 1980 to 2002. Dates for peaks and troughs were obtained from the National Bureau of Economic Research. As can be seen in the figure, during the three recessions which occurred during periods when defense spending was increasing, seasonally-adjusted employment increased, on average, by 0.8 percent in Hampton Roads while comparable U.S.

employment declined on average by 1.8 percent. Hampton Roads managed to prosper during those recessions because of the additional DoD expenditures being made in the regional economy during periods of increasing defense spending. As a result, the regional economy was buffered from the worse effects of the recession. By contrast and unfortunately, during the one recession which occurred in conjunction with a decline in defense spending, seasonally-adjusted employment in Hampton Roads declined by 1.6 percent from peak to trough while U.S. employment declined by a smaller 1.1 percent. In effect, the decline in defense spending amplified the national business cycle and caused a deeper recession in the regional economy than occurred nationally.[4]

The Sub Regional Economies

Unlike many other metropolitan regions, Hampton Roads has two sub regional economies because of the presence of several water bodies that divide the region into two unequal parts. The larger of the two economies lies south of the James River and the Hampton Roads harbor. This economy, referred to commonly as South Hampton Roads (SHR) has a population of well over one million. The other economy, which lies to the north of the James River and Hampton Roads harbor, is referred to as the Peninsula and has a population of one-half million. These two economies interact with each other and together constitute the Hampton Roads economy.

The growth characteristics of these two sub regional economies are somewhat different in spite of their close proximity to each other. A comparison of the historical growth experience of the two economies is shown in Figure 5. As can be seen in the figure, the two economies "track" each other closely. In fact, statistical studies done at HRPDC have typically found that variations in one economy have "explained" fifty-six percent of the variation in the other economy. However, because the South Hampton Roads economy is significantly larger than the economy on the Peninsula, variations in the south side economy tend to produce or be associated with larger variations on the Peninsula. In fact, a one percent change in the South Hampton Roads economy is normally associated with a 0.85 percent change on the Peninsula. By contrast, economic changes on the Peninsula normally generate smaller changes in the larger economy in South Hampton Roads. More precisely, a one percent change in the Peninsula economy is normally associated with a 0.65 percent change in the South Hampton Roads economy. This smaller effect (0.65% as compared to 0.85%) is consistent with the notion that smaller economies have a lesser ability to influence larger economies as compared to the influence that large economies can have on smaller ones. The direction and magnitude of trading between metro regions may also help to explain the differences in each economy's ability to influence each other. It may be, for example, that the Peninsula divides its

[4] The percent change in peak month to trough month employment for Hampton Roads and the U.S. were as follows: 1980 recession: +2.2% and –1.1%; 1981-1982 recession: +0.8% and 3.1%; 1990-1991 recession: -1.6% and –1.1%; 2001 recession: -0.6% and –1.2%.

trade relationships between the south side and the Richmond area while South Hampton Roads trades primarily with the Peninsula. If a greater share of the Peninsula's trade for goods and services is with Richmond than the south side's share of trade with Richmond, then the Peninsula's influence upon the south side would be less than the impact that the south side has upon the Peninsula. Both its smaller size and its closer proximity to Richmond and points beyond have combined to give the Peninsula a somewhat smaller impact on South Hampton Roads than the south side has on the Peninsula.

Figure 5: Annual Percent Change in Real Gross Regional Product on Each Side of Hampton Roads

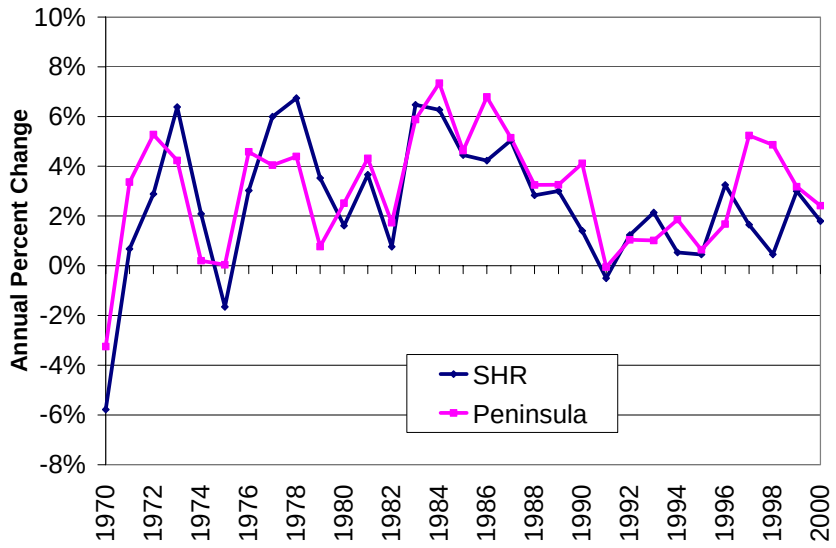
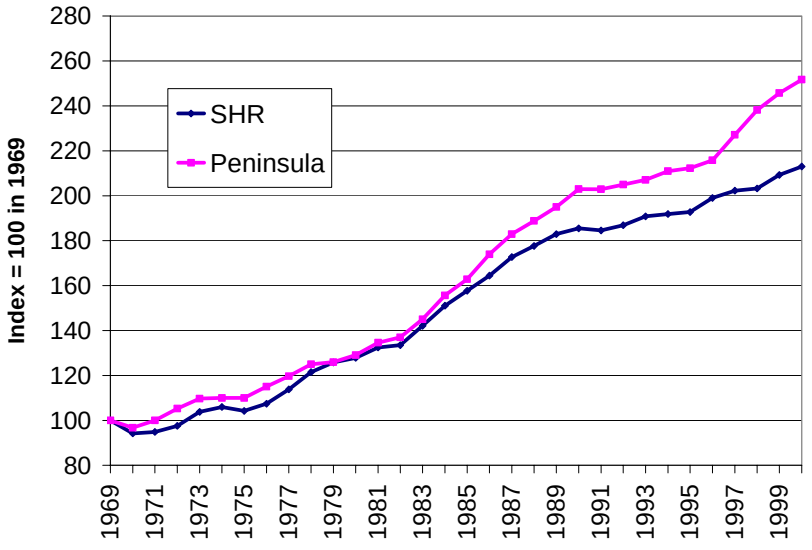


Figure 6: Growth in Real Gross Regional Product on Each Side of Hampton Roads



While the two sub regional economies move in similar ways through the business cycle, they differ in terms of their overall growth rates and economic stability-volatility. As can be seen in Figure 6, the Peninsula has experienced faster growth in its gross regional product than has South Hampton Roads. In fact, from 1970 through 2000, gross

regional product grew by 3.1 percent annually on the Peninsula compared to 2.8 percent in South Hampton Roads.

A detailed examination of the growth rates of the two economies indicates that the Peninsula began to grow appreciably faster than South Hampton Roads in 1979 and, as a result, has increased its share of the Hampton Roads economy from 38.2 percent in 1979 to 45.1 percent in 2000. Much of this difference in the growth rates of the two economies appears to have been related to the different ways in which changes in defense spending have impacted upon the two sub regional economies. During the period of the nation's defense buildup in the 1980s, the Peninsula benefited from the Reagan Administration's efforts to build a 600-ship naval fleet. A comparable increase in defense spending occurred on the south side but the acceleration in spending appears to have been less.[5] Furthermore, during the later defense builddown, South Hampton Roads lost many thousands of military jobs while the corresponding decline in military employment on the Peninsula was less.[6] In essence, it appears that much of the measured difference in the sub regional growth rates can be related to the nature of the changes in defense spending which have occurred over the past two decades,.

A shift-share analysis, explained in some detail below, confirmed the differential impact, which the defense cycle has had on the two sub regional economies.[7] The explanation for the faster pace of growth on the Peninsula suggested by the shift-share work is that the Peninsula has had a mix of slightly faster growing industries than has South Hampton Roads and that the Peninsula's economy was also been more competitive. The Peninsula's lesser dependency upon military jobs and its slower loss of military personnel during the period of the defense builddown in the 1990s is consistent with the finding that the Peninsula was favored with a faster growing mix of industries and more competitive industries in the decade of the 1990s. The somewhat lower level of competitiveness measured for South Hampton Roads may be due to its "cul-de-sac" location along with the associated difficulties in getting to I-95 and points beyond. Adding another tunnel across the harbor along with improvements to routes 460 and 58 would improve the south side's access to Richmond, Washington, D.C., and other important domestic markets and would improve the competitiveness of the south side economy.

[5] The Peninsula's shipbuilding employment grew by 43.0 percent because of increased Navy orders for ships from 1979 to 1985 while military employment on South Hampton Roads increased by just 13.9 percent over the same period.

[6] During the builddown, from 1990 to 1998, South Hampton Roads lost 26.2 percent of its military jobs while the Peninsula lost just 13.5 percent of its military jobs over the comparable period.

[7] Shift-share is a statistical procedure, which is used to "explain" the differences in the growth rates between two economies. In executing the analysis, the South Hampton Roads economy was chosen as the reference economy while the Peninsula's economy was the one that was "decomposed." Employment data used for the analysis came from the Commission's 53-Sector REMI model and covered the years 1990 and 2000.

Another difference between the two economies, as can be seen in Table 2, is that the Peninsula's economy has grown faster than South Hampton Roads with slightly less volatility. Both the standard deviation of annual percent changes in GRP and the coefficient of variation suggest slightly less volatility on the Peninsula and greater volatility in South Hampton Roads.

Table 2: Comparisons of Economic Stability

1970 to 2000

		Expressions of Regional Economic Stability	
	Compound Annual Percent Change	Standard Deviation of Annual Percent Changes	Coefficient of Variation
Real SHR GRP	2.76%	2.65%	0.96
Real Peninsula GRP	3.12%	2.32%	0.74

Components of Regional Growth

Decomposing regional growth can help to explain past patterns of regional economic growth. A well-known and widely used technique to achieve this "decomposition" is shift-share analysis. Shift-share separates the observed change in a local or regional economy into three components of change using sector data for the study area as well as similar data for a reference or comparison region. The technique requires data for two points in time; and because it is readily available, employment data is most commonly used to achieve the decomposition although other expressions of economic activity have also been used.

Three growth components are obtained from shift-share although some of the newer derivative methods have produced more. Those three components are growth or change attributable to national growth, growth due to a community's particular sector mix, and growth due to the competitiveness of the community's economy. Because these components fully describe the change in a community's economic activity, when added, their sum equals the observed change in a community's economy.

A shift-share analysis was conducted for this study in the hope that the calculated components might shed light on the pace of economic growth, which has occurred in Hampton Roads. The U.S. economy was chosen as the reference or comparison area with sector employment serving as the indicator of economic change. Several intervals of time were chosen for the analysis in order to see how the components have changed over the years.

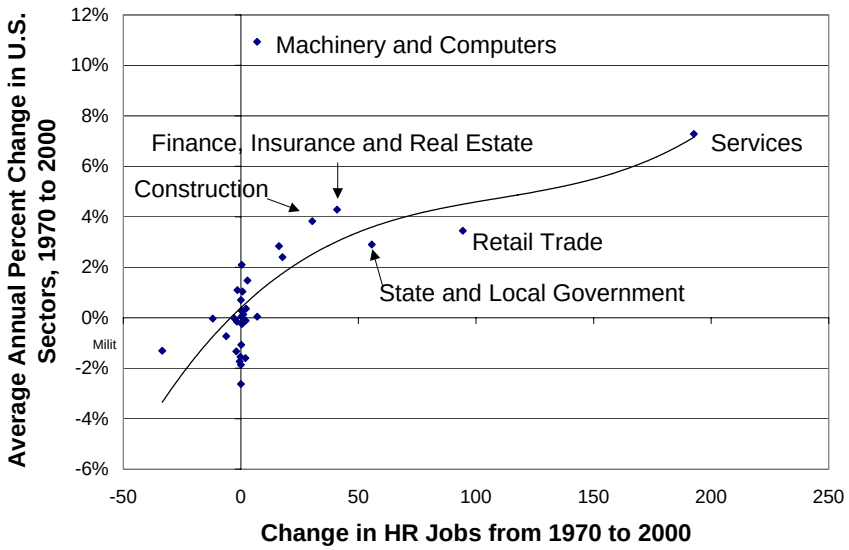
The first analysis was conducted for the thirty-year period from 1970 to 2000. During that period, the region added 414 thousand jobs. However, had the region grown at the national rate over this period, the region would have added over 463 thousand jobs. This difference (nearly 49 thousand jobs) between the actual number of jobs added and the theoretical number that would have been added if the region had grown at the U.S. rate is "explained" or accounted for by the change reflected in the mix and competitiveness components. As to the mix effect, according to shift share, the region "lost" or failed to gain some 154 thousand jobs because its sector mix was less favorable to growth than the mix possessed by the U.S. In other words, Hampton Roads had positioned its employment over this thirty-year interval of time into a mix of sectors which, in combination, grew less rapidly than the national mix of industries. By contrast, the region added some 105 thousand jobs over the same period because its industries tended to grow faster than comparable industries at the national level. The sum of the mix and competitive components (49 thousand jobs) fully account for the slower than expected growth suggested by the difference between the observed change in jobs and the expected change in jobs suggested by national employment growth from 1970 to 2000. In essence, the analysis suggests that while Hampton Roads has historically been concentrated in a mix of industries that has had below average growth rates it has offset that disadvantage by growing at above average rates of growth within its sectors when those sectors are compared to U.S. rates of growth in the same industries.

The results from the shift-share done for the 1970 to 2000 period are generally confirmed by three other shift share analyses done for the 1970-1980, 1980-1990, and 1990-2000 periods. The mix component was negative in two of the three analytical periods and was zero in the third period. In other words, the region's mix of industries has been less favorable to growth than the national mix of industries. Stated differently, Hampton Roads was disproportionately represented in slower growing industries when compared to the benchmark U.S. economy. By contrast, the competitiveness component was positive in two of the three decade-long periods – confirming the results of the shift-share done for the 1970 to 2000 period. Furthermore, while the industries of Hampton Roads have tended to outperform similar industries nationally (the competitive components have tended to be positive), unfortunately, when the competitive component values for the three decade-long intervals are expressed as a percent of the total growth in jobs for each period, those percentages have declined in each period when compared to the similar value for the preceding period. In other words, the competitiveness component when expressed as a percent of total job change is smaller in the 1980-1990 period (29.7%) as compared to the comparable value for the 1970-1980 period (39.5%). Similarly, the competitiveness component percentage is smaller in 1990-2000 (-16.0%) than is the comparable value for 1980-1990 (29.7%). The decline in these percentages is distressing since they suggest that the region may be experiencing a gradual decline in its

competitiveness – at least when comparisons are made against the benchmark U.S. economy.

Many of the results from the shift-share work can be confirmed using somewhat different methods. For example, the regional economy has gone through several restructurings over the last several decades. As a result, the mix of industries in the region is very different today from the mix, which existed several decades earlier. In essence, today's mix of industries has a higher representation in the more rapidly growing sectors. The rotation of the region's sectors from those, which have been slower growing to those, which have been faster growing is shown in Figure 7. In the figure, the growth experience of each sector is recorded by a dot with the change in jobs in Hampton Roads shown on the horizontal axis along with each sector's national growth rate on the vertical axis. As can be seen in the chart, those Hampton Roads sectors that have been adding the largest number of jobs are the sectors, which have been growing fastest nationally. Those Hampton Roads sectors which have added the fewest jobs or have been losing jobs are sectors which have recorded the slowest national growth rates. The result of this rotation from slower growing to faster growing sectors is that the region's economy is developing a mix of industries with the potential for higher rates of growth in the future. Stated differently, the regional economy has a greater representation today in the nation's faster growing sectors than was true several decades earlier.

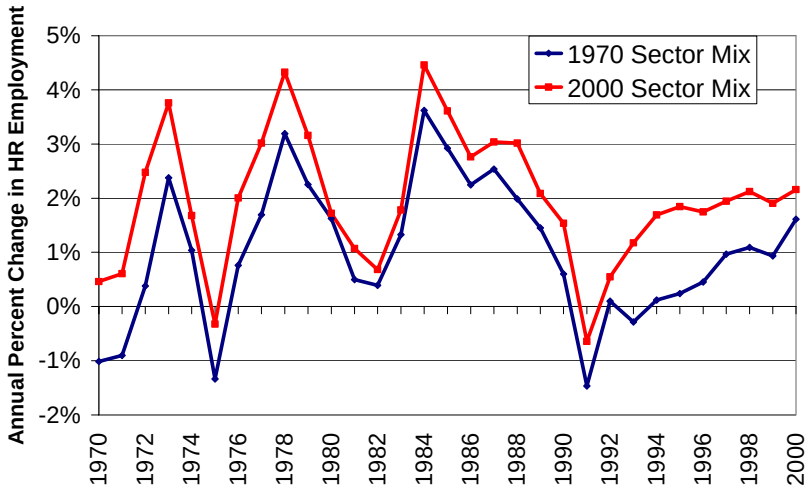
Figure 7: The Relationship Between Job Growth and U.S. Sector Growth Rates



The effect of this rotation to faster growing sectors can be seen in Figure 8. The figure contains lines which show the expected growth rate under two very different economic scenarios. The first or the lower of the two lines estimates the Hampton Roads annual percent change in employment if each sector in the regional economy were to grow at the rate for the same sector nationally and the regional economy contained the same sector mix as the one that existed in 1970.

In other words, the growth rates reflect U.S. sector growth rates which vary from year to year while the regional sector mix is held constant (the 1970 mix). The second or the upper of the two lines also assumes that each regional sector will grow at the rate for the same sector nationally but that the sector mix reflects the regional mix that existed in 2000. In other words, the sector growth rates were the same for the two lines but the mix of industries used to calculate regional growth rates were different (1970 and 2000). As can be seen, the regional growth rate is higher under the assumption of a 2000 sector mix as opposed to the assumption of the 1970 sector mix. The 2000 sector mix is the one which delivers faster growth and is likely to continue to deliver faster growth as compared to the mix which existed in 1970. In short, the region has developed and will continue to develop a set of industries which possess faster growth characteristics than the set of industries that existed several decades earlier.

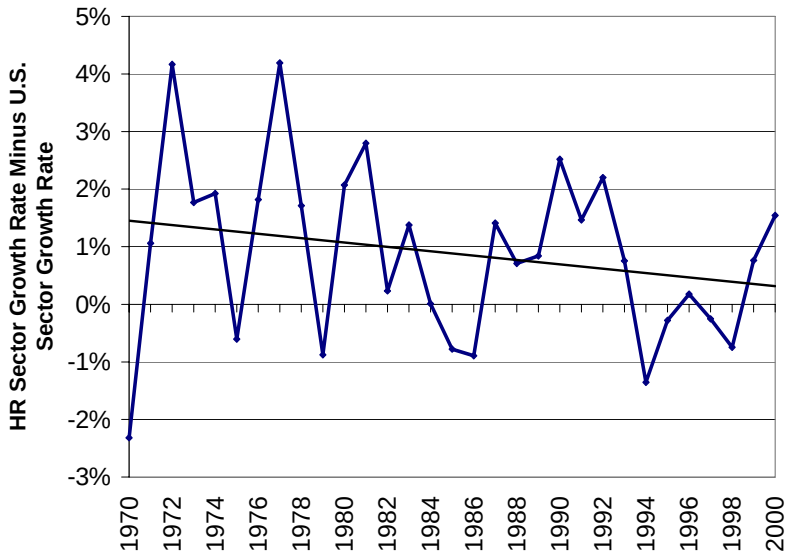
Figure 8: Estimated Growth Rates Implied by Applying 1970 and 2000 Sector Mixes to U.S. Annual Sector Growth Rates



Finally, the gradual erosion in the region's compete-tiveness as measured by the shift-share analyses is confirmed by the estimates contained in Figure 9. Like the construction of Figure 8, the estimates contained in Figure 9 assume a constant sector mix in Hampton Roads – in this case the mix which existed in the year 2000. However, unlike Figure 8, that 2000 sector mix was used to weight the difference in the annual sector growth rates for Hampton Roads and the U.S. More specifically, the annual U.S. employment growth in each sector was subtracted from the annual Hampton Roads employment growth rate in the same sector and that difference was then multiplied by the share that each regional sector represented of the Hampton Roads economy (also using employment data). Only basic sectors were used in the analysis since competitiveness is best examined from the standpoint of basic industries which are felt to drive a regional economy as opposed to non-basic sectors which respond to the basic sectors but are not generally considered themselves to be drivers of long-term economic growth. Each number displayed in the figure indicates the difference between the annual Hampton Roads growth rate and the annual U.S. growth rate for the average (in this case weighted average) sector in

the region. Since this difference in growth rates is frequently assumed to express the degree of regional economic competitiveness, then positive differences indicate a more competitive economy while negative differences indicate a less competitive economy. Fortunately for Hampton Roads, most observations on the chart are positive suggesting that the area's economy has typically been more competitive than the referenced national economy. However, the line on the chart has a downward trend suggesting that the area's competitiveness may be declining with the passage of time. It should be noted that defense cuts during the 1990s caused slower rates of growth in the region and that those cuts may have produced a downward bias in the numbers on the right side of the chart and, as a result, have caused the trend to have its downward slope. This downward bias is not likely to be large since only basic, as opposed to non-basic sectors, were used in the analysis.

Figure 9: Hampton Roads Sector Annual Growth Rates Minus U.S. Sector Annual Growth Rates Weighted by HR 2000 Sector Distribution



THE MILITARY PRESENCE

The economy of Hampton Roads has been impacted by the activities of the Department of Defense (DoD) for many decades. These activities occur at military installations, area shipyards, and at the facilities of various defense contractors. The economic impact generated by these various activities is substantial.

One way to view the military presence in the region is through the lens of DoD expenditures. Information on those expenditures is provided annually in the *Consolidated Federal Funds Report* released by the U.S. Census Bureau. The most recent *Report* covers expenditures made during FY 2002.

Table 3: DoD Expenditures in 2002

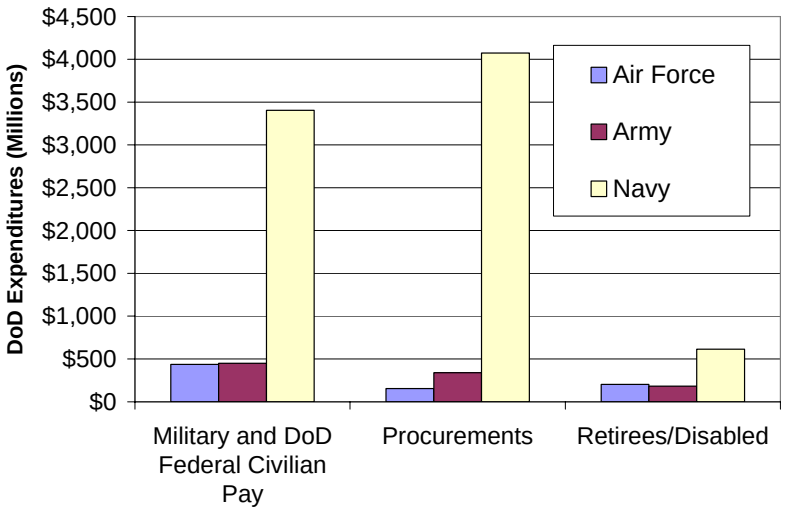
Jurisdiction	Federal Civilan Pay	Active Duty Military Pay	Inactive Duty Military Pay	Total Pay	Military Retirement and Disability Payments	Procurements	Military Medical Research	Basic Scientific Research	Basic Applied and Advanced Research in Science and Engineering	Air Force Defense Research Science Program	Total
Chesapeake	$21,637,000	$14,015,000	$0	$35,652,000	$108,675,000	$178,781,000	$0	$0	$0	$0	$323,108,000
Franklin	$0	$0	$0	$0	$1,442,000	$0	$0	$0	$0	$0	$1,442,000
Gloucester Co.	$0	$63,000	$0	$63,000	$17,901,000	$610,000	$0	$0	$0	$0	$18,574,000
Hampton	$139,042,000	$365,261,000	$2,538,000	$506,841,000	$125,742,000	$290,826,000	$0	$2,048,100	$0	$0	$925,457,100
Isle of Wight Co.	$277,000	$0	$0	$277,000	$11,831,000	$659,000	$0	$0	$149,694	$0	$12,916,694
James City Co.	$0	$0	$739,000	$739,000	$1,928,000	$94,000	$0	$0	$0	$0	$2,761,000
Newport News	$101,388,000	$247,421,000	$9,069,000	$357,878,000	$102,167,000	$1,983,603,000	$0	$0	$141,422	$0	$2,443,789,422
Norfolk	$429,927,000	$2,044,444,000	$23,396,000	$2,497,767,000	$113,808,000	$1,538,248,000	$977,088	$294,843	$0	$1,498,107	$4,152,593,038
Poquoson	$0	$1,386,000	$1,386,000	$2,772,000	$139,000	$230,000	$0	$0	$0	$0	$3,141,000
Portsmouth	$391,118,000	$128,519,000	$1,409,000	$521,046,000	$30,743,000	$252,981,000	$0	$0	$0	$0	$804,770,000
Southampton Co.	$0	$0	$0	$0	$1,606,000	$402,000	$0	$0	$0	$0	$2,008,000
Suffolk	$9,202,000	$6,067,000	$1,446,000	$16,715,000	$21,507,000	$111,321,000	$0	$0	$0	$0	$149,543,000
Surry Co.	$0	$0	$0	$0	$1,356,000	$21,000	$0	$0	$0	$0	$1,377,000
Virginia Beach	$196,898,000	$759,428,000	$6,882,000	$963,208,000	$433,133,000	$490,064,000	$0	$0	$0	$1,886,405,000	
Williamsburg	$2,953,000	$6,241,000	$231,000	$9,425,000	$61,673,000	$11,764,000	$0	$0	$0	$0	$82,862,000
York Co.	$28,055,000	$39,320,000	$0	$67,375,000	$66,016,000	$18,820,000	$0	$0	$0	$0	$152,211,000
Total	$1,298,860,000	$3,598,150,000	$47,096,000	$4,944,106,000	$990,992,000	$4,699,643,000	$977,088	$2,342,943	$291,116	$1,498,107	$10,962,958,254

Census "Program" Codes from the Consolidated Federal Funds Report:

Military Retirement and Disability Payments = DR.100
DoD Procurement Contracts = PC.100
Active Duty Pay = SW.100
Inactive Duty Pay = SW.200
DoD Federal Civilian Pay = SW.400
Military Medical Research = 12.420
Basic Scientific Research = 12.431
Basic Applied and Advanced Research in Science and Engineering = 12.630
Air Force Defense Research Science Program = 12.800

Data from the *Report* indicates that the DoD spent nearly $11.0 billion in Hampton Roads in FY 2002 as can be seen in Table 3. The largest piece of this spending or $4.9 billion was for military pay. This includes pay to military personnel (active and inactive military personnel) as well as the federal civilians working for the military departments.[8] Nearly as large were the procurement expenditures which reached nearly $4.7 billion. Finally, the smallest of the major expenditures, or $991 million, were made to former military personnel receiving retirement and disability pay. Much smaller expenditures were made for DoD research. The Navy made the majority of these expenditures as can be seen in Figure 10. Major DoD expenditures made by the Air Force, Army, and Navy in Hampton Roads are shown in Appendix B.

Figure 10: DoD Expenditures in Hampton Roads in 2002



These expenditures constituted a significant proportion of all such expenditures made by DoD as indicated in Table 4. In fact, pay to military

Table 4: Hampton Roads DoD Expenditures as a Percent of U.S. DoD Expenditures 2002

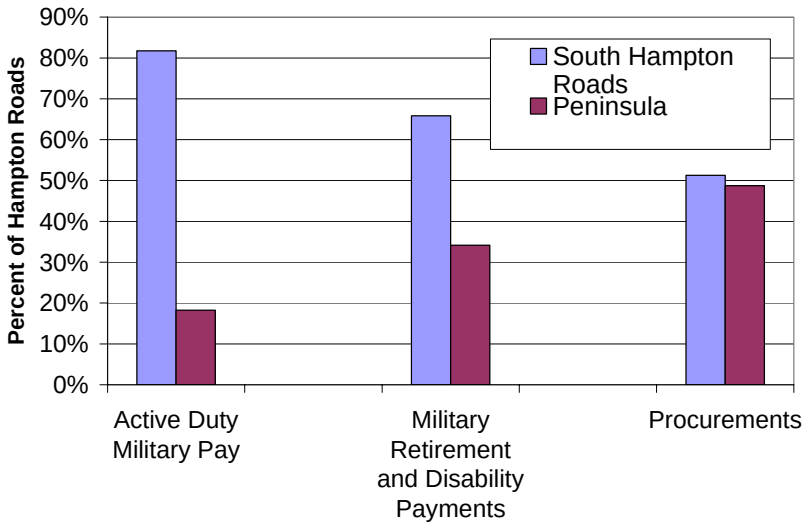
	U.S.	Hampton Roads	Percent of U.S.
DoD Retirement and Disability Payments			
Military	$33,803,849,000	$990,992,000	2.9%
DoD Procurements	$165,578,660,000	$4,532,843,000	2.7%
DoD Wages and Salaries			
Active Military	$41,216,342,000	$3,598,150,000	8.7%
Inactive Military	$7,672,851,000	$45,710,000	0.6%
Civilians	$27,211,184,000	$645,525,000	2.4%

[8] Inactive military personnel are persons in the reserves and the National Guard.

personnel was 8.7 percent of the nation's military pay (excluding pay to personnel stationed overseas).[9] Additionally, Hampton Roads military retirement and disability payments were 2.9 percent of all such payments while DoD procurements were 2.7 percent of total procurements. These percentages indicate that the area has a disproportionately large share of defense spending since the area's share of the nation's defense spending is several times higher than the region's share of the nation's population. Historically, the Hampton Roads population has been about one-half of one percent of the nation's population.

The majority of Hampton Roads DoD expenditures are made on the south side of the harbor as can be seen in Figure 11. The region's military personnel are predominantly stationed in South Hampton Roads so that more than eighty percent of the pay to military personnel goes to south side locations. Somewhat smaller is the region's share of retirement and disability pay going to South Hampton Roads. Finally, DoD procurement spending is split almost equally between the two sides of the harbor.

Figure 11: The Percent of DoD Expenditures on Each Side of Hampton Roads in 2002



DoD spending also varies considerably across the communities of Hampton Roads.[10] As can be seen in Figure 12, Norfolk is the leading recipient of DoD expenditures made in the area since it receives $3.7 billion of the region's $9.8 billion in defense expenditures. Other communities receiving large DoD expenditures are Newport News with $2.4 billion, Virginia Beach with $1.6 billion, Hampton with $909 million, and Portsmouth with $754 million. All other

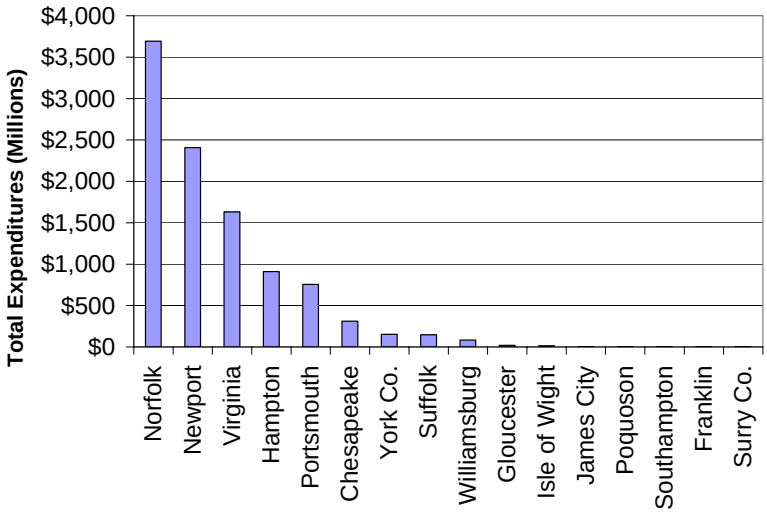
[9] Military pay includes salaries and wages, housing allowances as well as other minor forms of compensation.

[10] Federal civilian and active and inactive duty military pay are expressed on a place of work basis. Retiree pay is expressed on a place of residence basis. Procurements reflect the location of the DoD contractor.

communities received much less than one-half billion dollars in DoD expenditures as can be seen in FY 2002.

Employment is another expression of the impact of the Department of Defense on the regional economy. The region's largest source of DoD-generated employment is the presence of military personnel stationed at various bases and facilities in the area. According to the Bureau of Economic Analysis, there were slightly over 112 thousand military personnel assigned to installations in the Norfolk-Virginia Beach-Newport News MSA in 2001. These military personnel accounted for 11.6 percent of all the jobs in the region. These numbers are especially impressive when comparisons are made with other metropolitan regions. In fact, Hampton Roads ranked first among all of the nation's over 300 MSAs in terms of the sheer number of military personnel and eighth in the number of military personnel as a percent of total regional employment.

Figure 12: DoD Total Expenditures in Hampton Roads in 2002



The impact of the DoD on area employment does not end with the presence of military personnel in the region. Additionally, as can be seen in Table 5, more than 23 thousand federal civilian employees or half of all such federal workers were employed on the area's military installations in 2001 according to the DoD's *Base Structure Report.*[11] Furthermore, additional jobs have been created in the regional economy through shipbuilding and repair work that is done at the area's public and private shipyards. Currently, some 28 thousand workers are employed in the area's shipyards doing shipbuilding and repair work for the Navy. Finally, the area's numerous non-shipbuilding defense contractors employ a significant number of workers, further adding to the area's base of employment.

[11] The total number of military shown in the table excludes reservists.

Table 5: Base Employment by City in Hampton Roads
2003

	Employment				
	Military	Civilian	Other	Total	Percent
Chesapeake					
NAVSECGRUACT NWEST	516	5	0	521	0.4%
Total	516	5	0	521	0.4%
Hampton					
Fort Monroe	802	1,376	0	2,178	1.7%
Langley Air Force Base	9,169	1,776	0	10,945	8.5%
Total	9,971	3,152	0	13,123	10.2%
Newport News					
Fort Eustis	5,810	1,949	0	7,759	6.0%
Total	5,810	1,949	0	7,759	6.0%
Norfolk					
COMNAVBASE Norfolk	41,995	754	0	42,749	33.2%
FISC Norfolk	82	1,007	0	1,089	0.8%
NAVSTA Norfolk	12,970	1,063	1	14,034	10.9%
NAVSUPPACT Norfolk	1,523	1,388	0	2,911	2.3%
PWC Norfolk	20	2,573	0	2,593	2.0%
Total	56,590	6,785	1	63,376	49.1%
Portsmouth					
NAVMEDCEN Portsmouth	3,130	1,262	0	4,392	3.4%
NSY Norfolk	1,115	10,399	0	11,514	8.9%
Total	4,245	11,661	0	15,906	12.3%
Virginia Beach					
Fort Story	1,774	24	0	1,798	1.4%
NAVPHIBASE Little Creek	10,090	1,096	0	11,187	8.7%
NAS Oceana	12,545	770	0	13,315	10.3%
Total	24,409	1,890	0	26,300	20.4%
York County					0.0%
WPNSUPPFAC Yorktown	1,889	75	0	1,964	1.5%
Total	1,889	75	0	1,964	1.5%
Hampton Roads	103,430	25,517	1	128,949	100.0%

An estimate of the direct impact of DoD jobs on the regional economy is shown in Figure 13 that sums the area's military, federal civilian, and shipbuilding/repair jobs from 1969 to 2001. As the figure indicates, the region had nearly 186 thousand DoD related (military, federal civilian, and shipbuilding) jobs in 2001.[12] These jobs led to the creation of additional jobs in the regional economy through the multiplier process.[13] As can be seen in Figure 14**,** nearly 120 thousand additional jobs were created in the regional economy through the multiplier process to produce over 305 thousand jobs in the regional economy traceable to DoD expenditures in the year 2001. Since the region had approximately one million jobs at the time, these DoD-connected jobs account for approximately thirty percent of all jobs in Hampton Roads.

[12] The figure counts all federal civilians as being employed by DoD, which leads to an inflated estimate. However, this overestimate is largely offset by not including area jobs created by non-shipbuilding defense contractors.

[13] The multiplier process describes the way in which an economy is impacted by successive rounds of spending triggered by an initial expenditure.

The region's military personnel are not assigned to facilities uniformly scattered about the area but are instead concentrated on bases, which are located in just a few communities. In fact, as can be seen in Figure 15, sixty thousand of the area's military jobs or fifty-four percent of the regional total are located in Norfolk. A much smaller number are located in Virginia Beach, which has over twenty-four thousand military jobs, or over twenty-one percent of all military jobs in the area. All other communities have fewer than ten thousand military personnel assigned to their bases as can be seen in the figure. In total, eighty-one percent of the area's military personnel work on bases located in South Hampton Roads – nineteen percent are on the Peninsula.[14]

Figure 13: DOD-Connected Employment in Hampton Roads

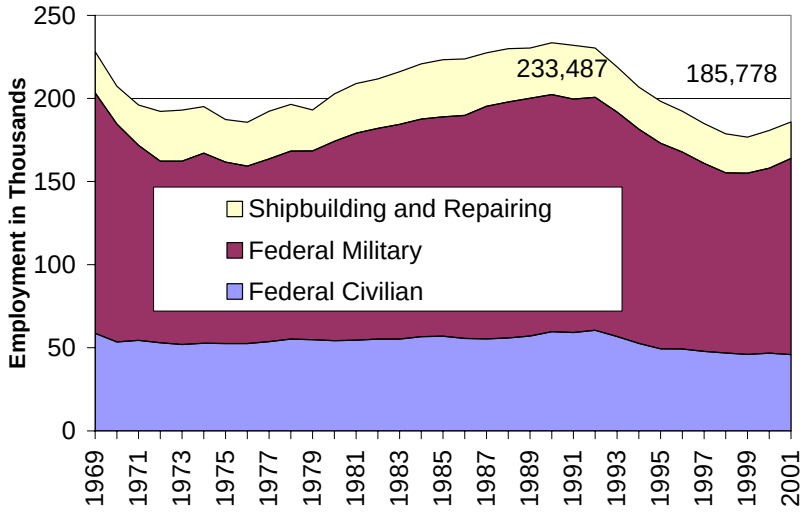
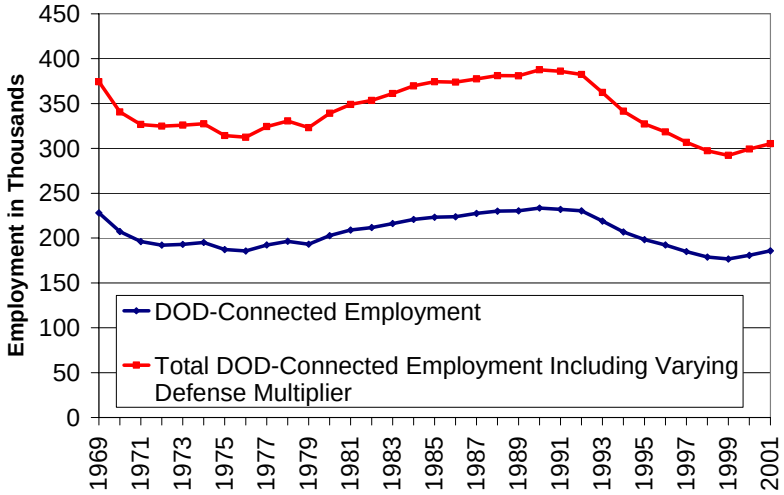


Figure 14: DOD-Connected Employment in Hampton Roads



[14] Numbers in the figure include active duty and reservists. Reservists are found in all of the communities of the region.

While Norfolk leads in terms of the number of military personnel assigned to its bases, Virginia Beach leads among area communities in the number of residents who are members of the military, regardless of the base to which they are assigned as can be seen in Figure 16. Norfolk ranks second in the number of military residents. All other political jurisdictions have far fewer military residents. While eighty-one percent of the area's military personnel work in South Hampton Roads, only seventy-seven percent of all the region's military reside south of the James River. In other words, a significant number of the region's military personnel who work on bases in South Hampton Roads commute from the Peninsula. By contrast, a relative small number of military personnel who work on the Peninsula commute from South Hampton Roads. These commuting trips made by area military personnel reflect the overall pattern of commuting in the region since in 2000, 9.7 percent of Peninsula residents commuted to jobs on

Figure 15: Hampton Roads Military Employment in 2000

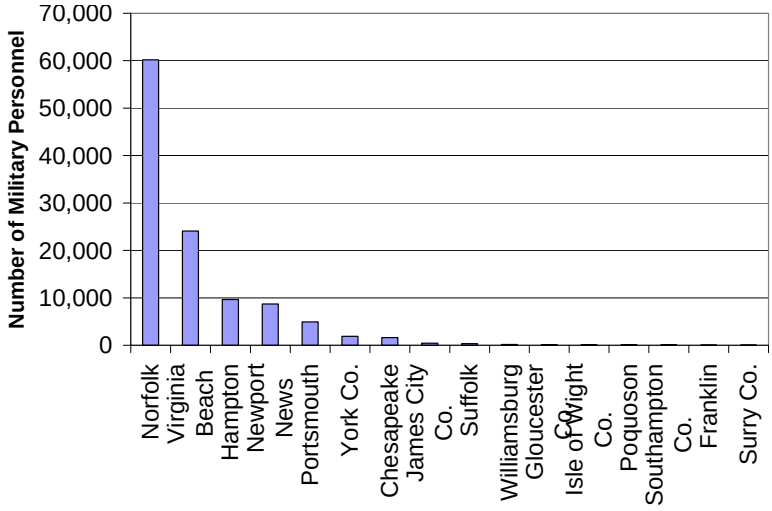
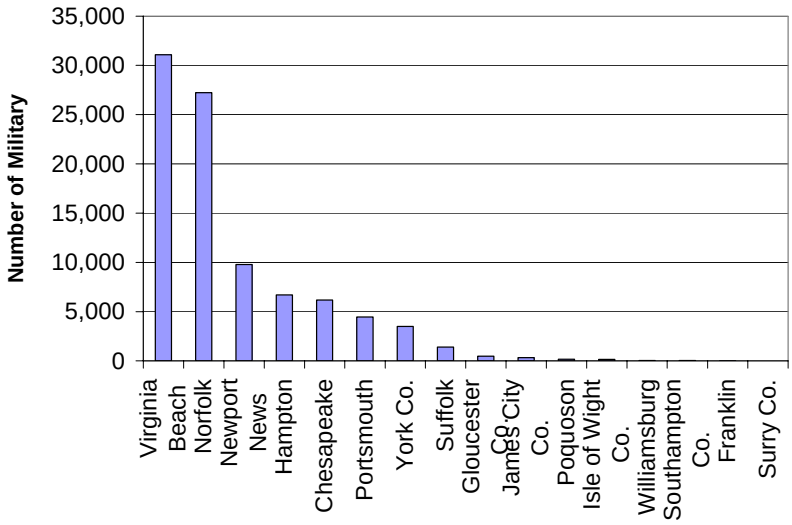


Figure 16: Place of Residence of HR Military Personnel in 2000



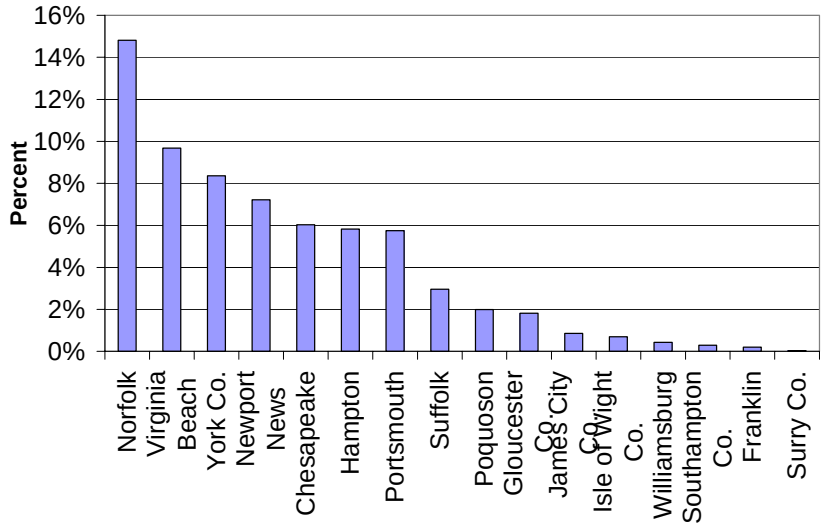
the south side while only 4.2 percent of the residents of the South Hampton Roads commuted to jobs on the Peninsula.

Finally, the area's military personnel comprise a significant share of the region's labor force. In fact, nearly fifteen percent of Norfolk's entire labor force is accounted for by members of the armed forces. The ranking of other communities in the region can be seen in the Figure 17.

Consequences of the Military Presence

While the presence of DoD spending in the regional economy has been of considerable benefit, it has not come without cost. One of these is that large-scale deployments of military personnel have occurred and these deployments have had significant and damaging impacts on the regional economy. These deployments have occurred with some regularity over the past several decades and have produced an assortment of negative effects on regional businesses, neighborhoods, and political jurisdictions.

Figure 17: Percent of Labor Force in Military in 2000

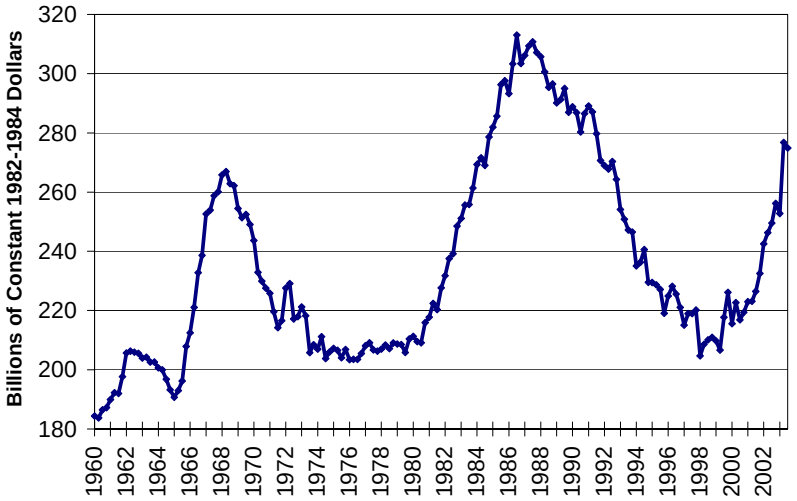


Another of these difficulties is that, from time to time, regional defense spending declines, as can be seen in Figure 18, producing hardships upon the people and businesses of the area. During such times, the region's unemployment rate rises and its wages and incomes grow more slowly. One of those declines occurred from 1987 to 1998 when the nation went through a period of defense downsizing following the end of the Cold War. In fact, from 1990 to 1999, Hampton Roads experienced a loss of nearly 57 thousand DoD (military, federal civilian, shipbuilding) jobs that eventually produced a total loss of over 95 thousand jobs (including the DoD jobs) after allowing for the effect of the multiplier process in the economy. This reduction represented a loss of nearly one job in every ten in the region. Furthermore, while the region has not closed any of its bases, Hampton Roads still experienced the loss of twenty-

eighty thousand military personnel. This was the second largest loss among the nation's MSAs with only San Diego recording a larger reduction in military personnel.

The loss of these valuable DoD-connected jobs from the regional economy had an important but negative impact upon the region's standard of living. One expression of this impact is the average wage paid to workers in Hampton Roads. For example, in 1984, the average wage in Hampton Roads was 102 percent of the average U.S. wage. By contrast, in 2000, the average regional wage had fallen to slightly over 89 percent of the average U.S. wage. Much of this decline occurred because of the rotation away from high-paying defense sector jobs to lower paying civilian jobs in the retail and service sectors. In fact, using IMPLAN, a regional input-output model, the staff of the Hampton Roads Planning District Commission has estimated that the wages for jobs lost in the defense sector along with other jobs lost through the multiplier process paid, on average, 125 percent of the average regional wage. The majority of those jobs were "replaced" with newly created jobs in the service and retail sectors that paid approximately 85 percent of the average regional wage. This rotation away from high-paying jobs in the defense and related sectors to lower-paying service and retail jobs contributed importantly to the erosion of wages and incomes in the regional economy relative to wages and incomes elsewhere. Also, since wages are a leading ingredient in the computation of per capita income, area incomes have also declined relative to similar incomes found elsewhere. In fact, over the period from 1987 to 2000, 89 percent of the nation's MSAs increased their per capita income faster than did Hampton Roads. Other impacts resulting from the loss of DoD-connected jobs included an increase in the regional unemployment rate relative to the rest of the nation and most other MSAs, an increase in net out migration of population, and reduced rates of regional economic growth.

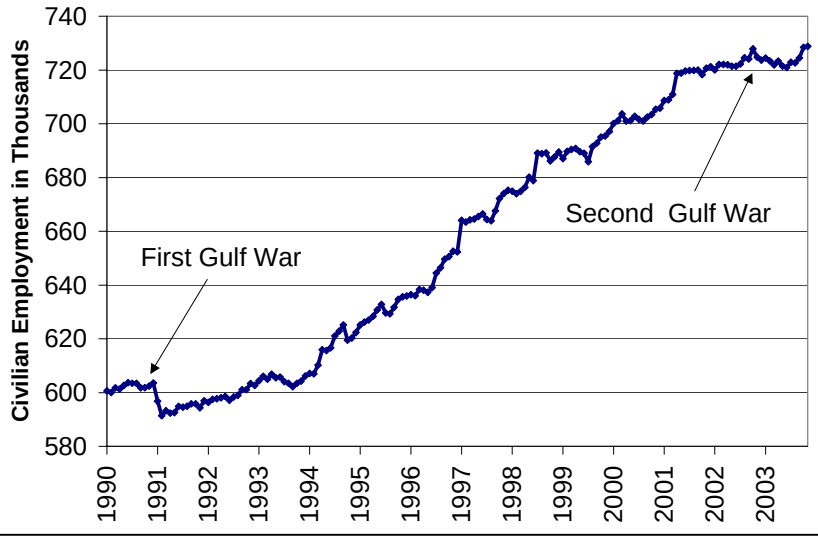
Figure 18: Annualized Defense Outlays



REGIONAL SENSITIVITY TO THE MILITARY CYCLE

The regional economy is powerfully impacted by changes in the local level of defense spending. The next two sections explore the extent to which the Hampton Roads economy experiences economic "shocks" as a result of short and long-term variations in the level of military activity in Hampton Roads.

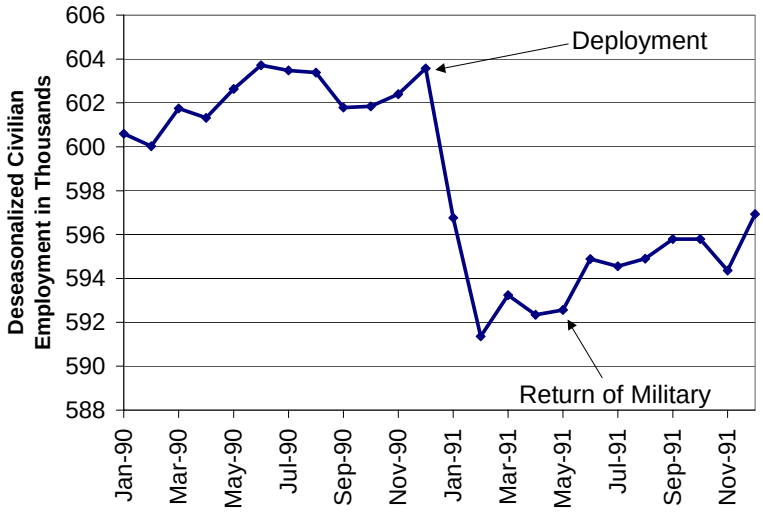
Figure 19: Employment in Hampton Roads



The Impact of Deployments and War

The regional economy has suffered from the effects of two large deployments since 1990. The impact can be seen in the region's civilian employment growth since 1990 shown in Figure 19.

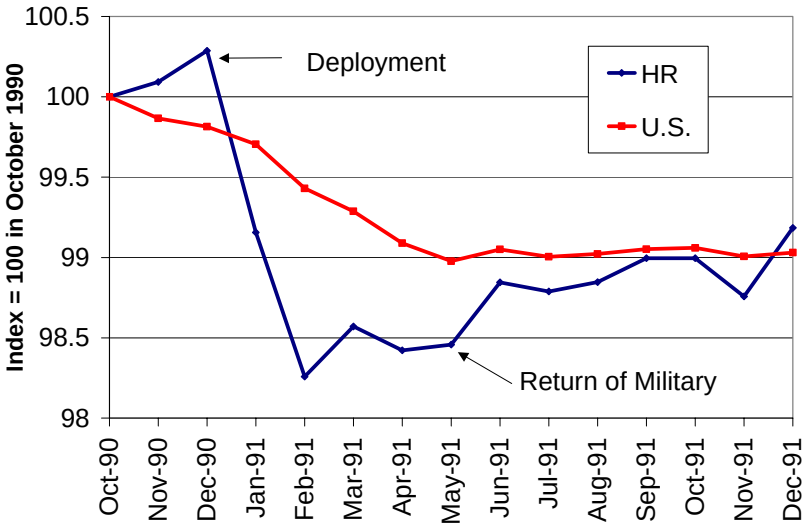
Figure 20: Employment in Hampton Roads During the First Gulf War



The first of the two deployments occurred during the period from December 1990 to May 1991 when some 45 thousand military personnel were deployed to fight the war

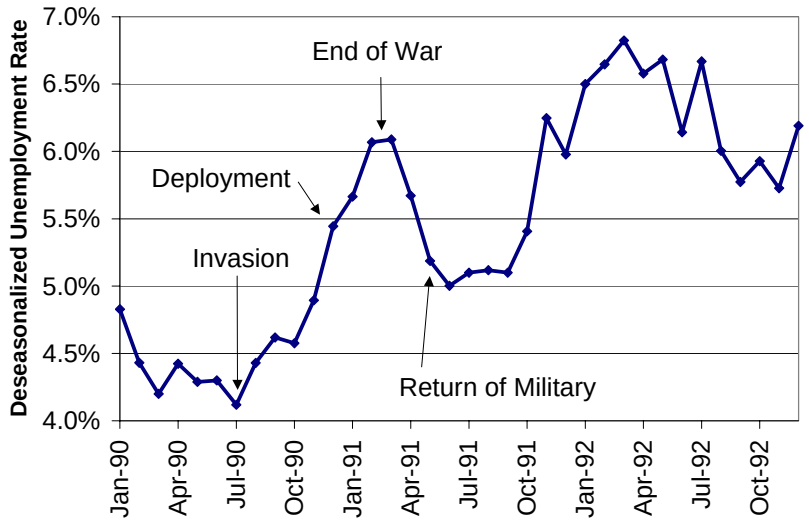
in the Persian Gulf triggered by the invasion of Kuwait by Iraq. As can be seen in Figure 20, this led to the loss of more than twelve thousand civilian jobs in the regional economy from December 1990, when the invasion occurred, to February 1991, when the war ended. This loss of jobs, when expressed as a proportion of all the jobs in the regional economy, was greater than the proportional decline in jobs nationally as can be seen in Figure 21. As a result of the loss of jobs in the region, the area's unemployment rate increased shown in Figure 22. In fact, the unemployment rate in Hampton Roads increased from 4.1 percent at the time of the invasion to 6.1 percent by the end of the war. Other economic indicators such as initial unemployment claims, residential construction, new home sales, and auto sales also showed signs of economic weakness at the time of the deployment/war.

Figure 21: The Employment Impact of the First Gulf War



Another deployment, again to the Persian Gulf, occurred in late 2002 and early 2003. This deployment led to the departure of more than thirty thousand military personnel from the region plus some military

Figure 22: The Unemployment Rate in Hampton Roads During the First Gulf War



dependents who elected to leave the area until the conclusion of the deployment. This second deployment produced a smaller impact on the regional economy than the first. In fact, the region experienced the loss of just three thousand jobs in the deployment of 2003 as compared to twelve thousand in the preceding decade as can be seen in Figure 23. However, another three thousand jobs were lost in the three months leading up to the start of the deployment – perhaps in anticipation of events to come as the community prepared for the deployment. Not only was the loss of jobs smaller than the one that occurred earlier in the 1990s but the proportional decline in jobs was less as can be seen in Figure 24. Furthermore, the proportional loss in jobs for both the U.S. and Hampton Roads were less in the deployment of 2003 than the one that occurred in the early 1990s. The primary reason for the smaller decline in jobs in 2003 as opposed to the earlier deployment is that the number of military personnel deployed was smaller

Figure 23: Employment in Hampton Roads During the Second Gulf War

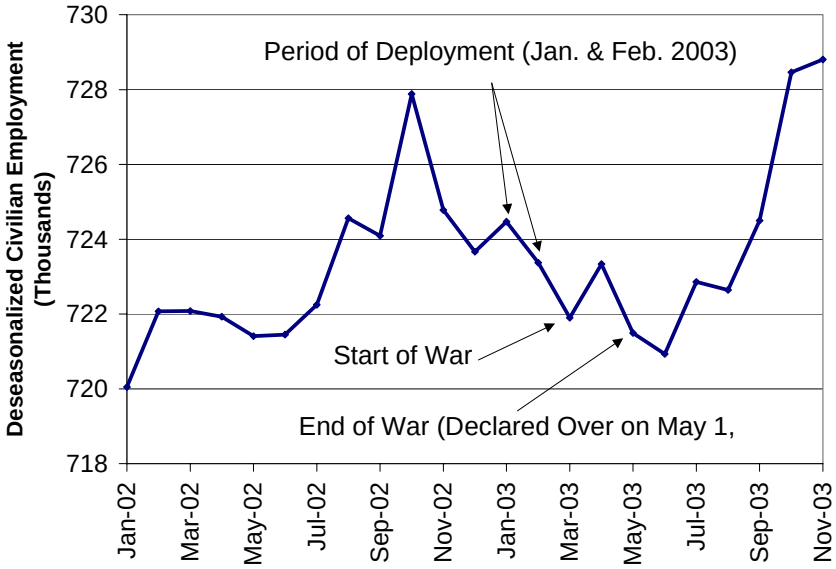
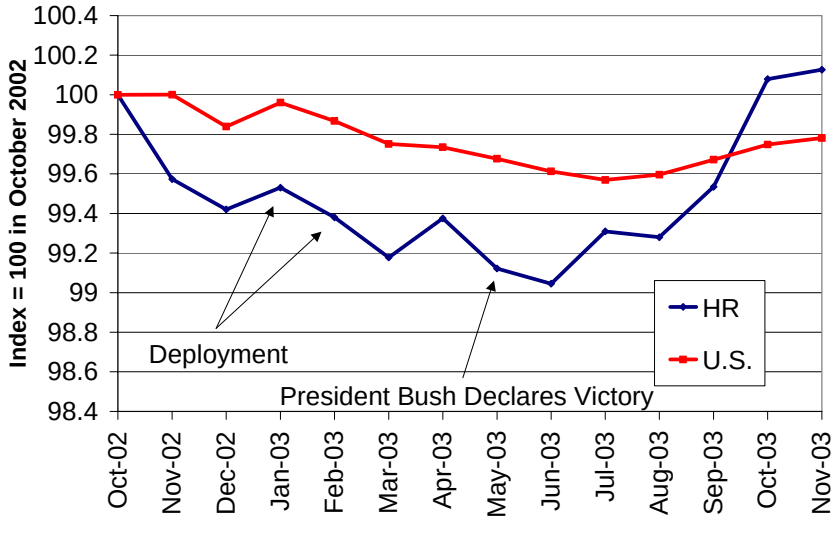


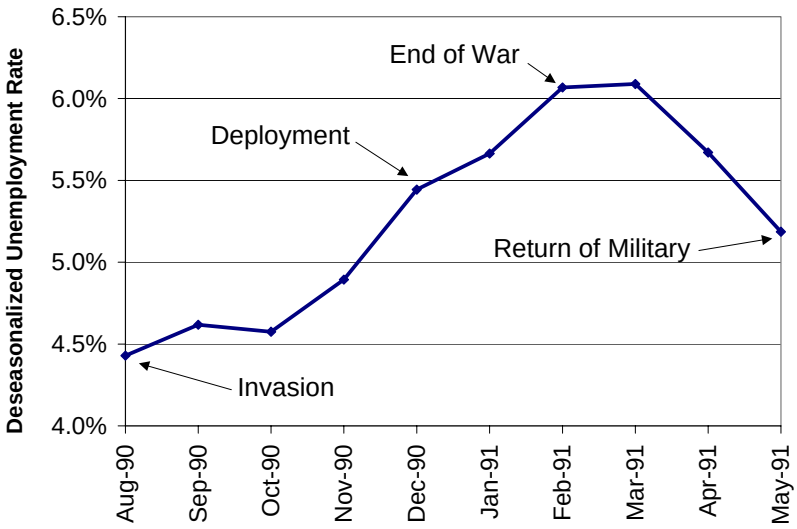
Figure 24: The Employment Impact of the Second Gulf War



in 2003 and the economy was larger. Stated differently, the share of the jobs deployed in 2003 was smaller than the share of jobs deployed from the region in the 1990s. The area's unemployment rate increased as a result of the decline in regional employment as shown in Figure 25.

It is important to note that the decline in employment at the time of the two deployments/wars cannot be attributed entirely to the impact of those events. However, since the period of time covered by the deployments was relatively short, it is likely that most of the decline in jobs as well as the deterioration in other economic indicators occurred because of the deployment and war. Each deployment and war led to a temporary decline in consumer and business confidence along with a loss of jobs, all of which caused a slowdown in the pace of spending both in Hampton Roads and elsewhere.

Figure 25: The Unemployment Rate in Hampton Roads During the Second Gulf War



The economic impact of the last two deployments varied by political jurisdictions. Since military personnel tend to spend more heavily in the communities in which they live and in the communities in which they work than in other locations, those localities experienced significant reductions in total spending during the deployments which produced the sorts of impacts described above. Furthermore, because consumer and business confidence declined throughout the region, especially hard hit were those communities dependent on travel and tourism since a significant share of personnel travel is discretionary in nature and can be postponed if necessary. As a result, during each deployment/war, travel activity declined as people postponed or cancelled their travel plans and the area's travel destinations suffered.[15]

[15] Visitations to area military personnel may also have declined since there were fewer military personnel in the region to visit during the deployments.

An estimate of the impact of the last two deployments on employment in the region can be seen in Table 6 which compares the change in jurisdiction employment from the fourth quarter of one year to the second quarter of the

Table 6: A Comparison of Employment Growth During War and Non-War Periods

Data Shows the Percent Change in Civilian Employment Between the Fourth Quarter of One Year to the Second Quarter of the Following Year

Jurisdictions with Military Bases/Large Number of Military Personnel/Large Tourism Presence	Major Deployment/War Years			Average of Non-War Years	Difference Between War andNon-War Years*
	1991	2003	Average	1992 - 2002	
James City	2.94%	1.44%	2.19%	12.22%	-10.03%
Williamsburg	-5.18%	-9.80%	-7.49%	1.64%	-9.13%
York	-0.35%	-4.12%	-2.24%	4.72%	-6.96%
Norfolk	-6.70%	-3.28%	-4.99%	-0.79%	-4.20%
Virginia Beach	1.16%	-5.48%	-2.16%	1.45%	-3.61%
Suffolk	-2.54%	-2.44%	-2.49%	-0.91%	-1.58%
Hampton	-0.12%	-3.14%	-1.63%	-0.63%	-1.01%
Poquoson	3.46%	-1.34%	1.06%	1.83%	-0.77%
Newport News	-0.63%	-0.82%	-0.73%	-0.62%	-0.10%
Portsmouth	-1.16%	1.93%	0.38%	-0.30%	0.68%
Chesapeake	1.31%	3.64%	2.47%	1.46%	1.01%

* Difference was computed by subtracting the non-war average from the war average.
Negative numbers indicate the amount of decline in growth during the war years as compared to the non-war years.

following year. The impact of the deployment was largely confined to those quarters since the deployments and their associated wars occurred during the first two quarters of 1991 and 2003. Comparing the change in employment over that interval of time “picks up” the impact of the deployment as well as the chilling effects on business activity that are typically generated by war. The table makes a comparison between the average changes in employment during the deployment/war years with the average of the same changes that occurred during the non-deployment/war years from 1992 to 2002. In addition, the average change from the non-deployment/war years is subtracted from the deployment year average so as to estimate the effect of the deployments. In effect, this subtraction eliminates the “normal” change from the observed change during the deployment years in an attempt to remove or isolate the effect of the deployment from the change in employment that typically occurs over the fourth to the second quarters of the year. As can be seen in the table, in all but two communities the change in employment over the period from the fourth to the second quarter of the following year showed a larger decline during the deployment years than was true for the non-deployment years. Especially large declines were experienced in both James City County and Williamsburg - probably because of a reduction in recreational travel to those locations.

Somewhat smaller declines were experienced in York County, Norfolk, Virginia Beach, Suffolk, Hampton, Poquoson, and Newport News. Each of those declines occurred because of the large military presence in those communities – either because of the military that worked there, lived there, or both. Only Portsmouth and Chesapeake did not register a decline in employment attributable to the deployments.[16]

Geographical differences in military impacts can be very large at the level of individual streets and neighborhoods. For example, businesses located along north Military Highway, Little Creek Road, and Hampton Boulevard in Norfolk are dramatically impacted by changes in military activity at bases in that city since those arteries play a critically important role in moving personnel to and from military installations. Any decline in traffic along those arteries caused by deployments can have adverse consequences for businesses in the area. Similarly, businesses located along General Booth and Lynnhaven Boulevards in Virginia Beach also suffer from military deployments because of their proximity to bases and neighborhoods with military populations.

Deployments not only slow local economies and impact selected neighborhoods but they also put a disproportionately heavy burden on the families of those persons who are deployed. This impact is especially great for reservists and members of the National Guard since they almost always experience a decrease in pay when they go on active duty. This reduces the standard of living for them and their families and may subject their homes to mortgage foreclosure. These and other financial difficulties may damage their credit ranking and make it difficult for them to later finance the purchase of a home or car or start a new business. Furthermore, many reservists and guardsmen are already business owners and their businesses frequently suffer while they are away on active duty. Finally, deployments not only hurt reservists and guardsmen but the employers for whom they work suffer the loss of workers when members of their workforce are called up – many of whom may be critically important company employees that cannot be easily replaced.

Also, various kinds of businesses experience deployments differently. Historically, businesses which have been hurt the most have been furniture stores, auto dealerships, electronics stores, eating and drinking establishments, and carpet and home furnishings stores. By contrast, the impact experienced by appliance, grocery, and women's apparel stores has frequently been small.

The Impact of the Defense Cycle

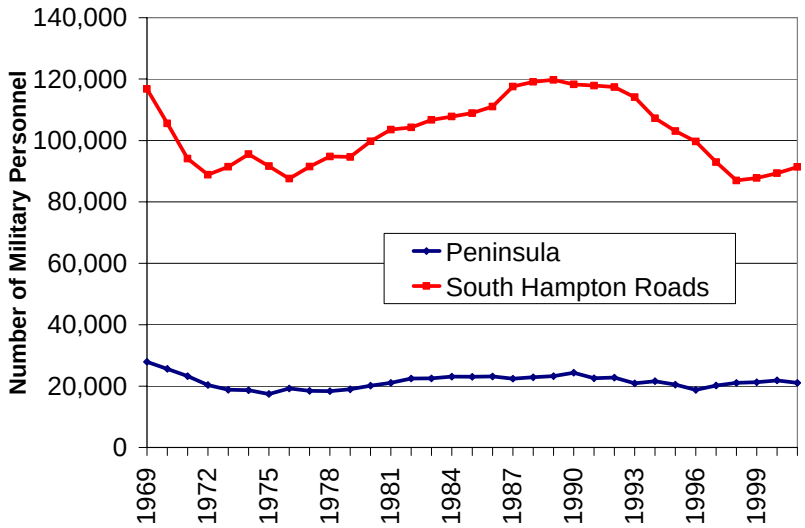
The nation's defense expenditures vary from year to year – often times producing a cycle of significant duration. For example, the most recent cycle troughed or bottomed in 1976 and rose to a peak in 1987 only to decline to make

[16] The experience of communities known to have little if any military presence/impacts were excluded from the analysis.

another trough in 1998. In this case, the full cycle from trough to trough took 22 years. Since 1998, expenditures have been rising and many expect that trend of increasing expenditures to continue although budget deficits now threaten future defense spending.

This cycle in the magnitude of defense spending influences the business cycle in Hampton Roads. During periods when defense spending is increasing, the revenues of area defense contractors increase and the number of military personnel assigned to Hampton Roads increases. During periods when defense spending is decreasing, contractor revenues fall and the number of military personnel declines. Changes in the number of military personnel on each side of Hampton Roads are shown in Figure 26. The information in Figure 26 is indexed to one hundred in 1969 in Figure 27 and shows that the Peninsula experienced a reduction in the number of its military personnel in the early 1970s (the Vietnam builddown period). The subsequent increase in defense spending, beginning in 1976, failed to return the number of military personnel to former levels on the Peninsula as opposed to the very large increase in personnel that occurred in South Hampton Roads.

Figure 26: The Number of Military Personnel on Each Side of Hampton Roads



Changes in the number of military personnel assigned to the area produce varying impacts upon the regional economy. The two lines in Figure 28 suggest the relationship between changes in the level of military employment in the region and changes in GRP. The illustration was prepared by "exercising" a regression equation using annual percent change data over the period from 1970 to 2000. As can be seen in the figure, annual percent changes in U.S. GDP, shown on the horizontal axis, and Hampton Roads military employment, represented by the diagonal line running across the graph, are used to explain variations in the region's GRP, shown on the vertical axis. The diagonal lines indicate differences in the impact of two hypothetical changes in military employment. The upper of the two lines shows the annual percent change which

might be expected to occur in Hampton Roads GRP given various rates of U.S. growth and an increase in Hampton Roads military employment of three percent annually. The lower of the two lines shows the annual percent change which might be expected in Hampton Roads GRP given the same rates of U.S. growth and a decrease in Hampton Roads military employment of three percent annually. The difference between the two lines or scenarios is two percentage points of growth in the Hampton Roads economy. In other words, as the region's economic environment changes from one in which the number of military personnel in the region is increasing by three percent per year to one in which the number of military personnel is decreasing by three percent per year the region's economy can be expected to grow more slowly by two full percentage points at any level of U.S. economic growth. For example, should the U.S. economy grow at two percent in any given year, Hampton Roads might be expected to grow by one percent in the same year if the number of military in the region is decreasing at the rate of three percent. By contrast, the region might be

Figure 27: Changes in the Level of Military Activity on Each Side of Hampton Roads

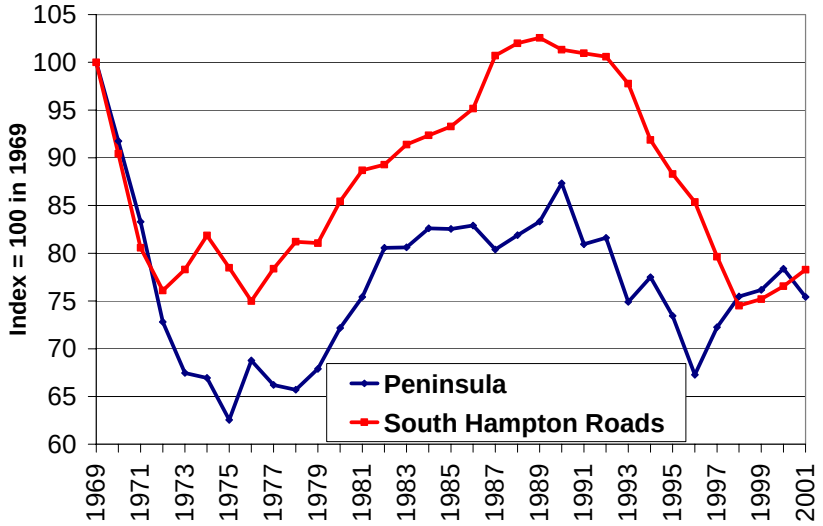
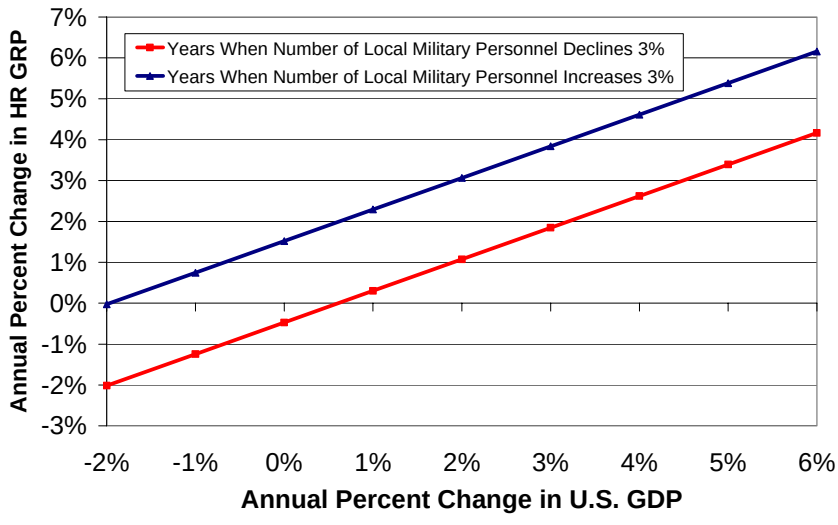


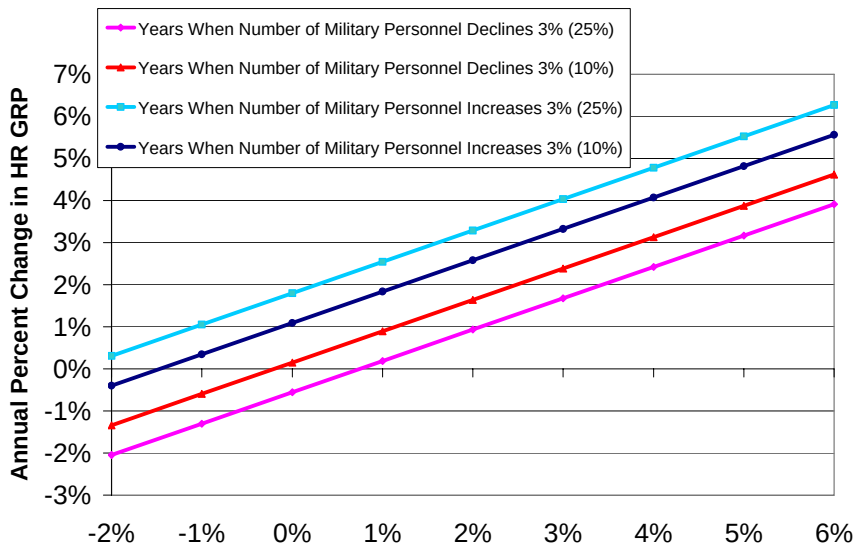
Figure 28: The Relationship Between Growth in U.S. and HR Economies Assuming Different Changes in Regional Military Activity



expected to grow by three percent in an environment in which the number of the area's military personnel is increasing by three percent annually. The figure displays the results for changes in the military of three percent annually but other lines could be drawn for other annual rates of change.

Changes in the number of military personnel assigned to the region are producing smaller changes with the passage of time as the region continues to diversify its economy. This point is illustrated in Figure 29, which was constructed like Figure 28 since annual percent changes of plus and minus three percent in the number of military personnel assigned to the area are investigated. However, unlike Figure 28, Figure 29 shows the impact of three percent changes making the assumption that the number of military constitute either ten or twenty-five percent of the total number of jobs in the region. As can be seen in the figure, three percent increases or decreases in the number of military personnel in the region produces a larger impact on regional growth when the military comprise twenty-five percent of the employment base in the area than when the military comprise only ten percent. The difference in the region's growth rate of between ten and twenty-five percent is slightly over one half of one percent of annual change in regional GRP. Since military employment was near twenty-five percent of all jobs in 1970 and near ten percent in 2000, it is clear that, with the passage of time, changes in the level of military activity in Hampton Roads are producing ever-smaller changes in economic activity in the region.

Figure 29: The Relationship Between Growth in U.S. and HR Economies Assuming Different Changes in Regional Military Activity and Different Regional Contributions from the Military



In an effort to further explore the relationship between changes in the number of military personnel stationed in the region and the area's economy,

three REMI simulations were conducted.[17] The first assumed that an additional one thousand military personnel would be assigned to Hampton Roads in 2004. All of these military personnel were assumed to arrive in 2004 and that the allocation of the new military personnel across area jurisdictions would be the same as the current allocation of personnel.

Furthermore, in order to explore the impact on the region of the addition of personnel on each side alone, two additional simulations were conducted. The first assumed that all of the one thousand military personnel would be located on the Peninsula; the other made a similar assumption for South Hampton Roads. While all three simulations examined the impact of the addition of one thousand military jobs, it should be understood that, because the REMI model calculates increases and decreases symmetrically, the impact of a decrease of one thousand military personnel is simply the same as for an increase except that all estimates are in the opposite direction (positive impacts become negative and negative impacts become positive). Furthermore, because REMI impacts are largely measured linearly, increases and decreases other than for one thousand military can be estimated by scaling the simulation results higher or lower to arrive at impacts for a different number of military personnel. Finally, REMI estimates impacts by year in order to show how the economy adjusts over time to an initial change in economic activity.

The results of the first simulation, assuming one thousand new military jobs, are shown in Table 7. As can be seen in the table, the addition of one thousand military personnel would generate an increase in Hampton Roads GRP of more than $125 million in 2004 with that impact declining to $110 million by the year 2010. The impact in gross product declines with the passage of time since the economic growth generated by the new jobs causes the cost of production to rise in selected sectors and that tends to slow the pace of economic growth in those sectors. This sector slowdown led to a more general slowdown region wide.

The increase in GRP is caused in large part by the creation of new jobs in the economy. In fact, as can be seen in the table, nearly seventeen hundred new jobs are created in 2004 with one thousand of those jobs being the original new military jobs. Employment declines slightly with the passage of time in response to the increase in the cost of doing business in the region. Sectors experiencing the largest increases in employment are retail trade, construction, state and local government, and eating and drinking establishments, each of which responds to the increase in the region's population. The simulation further

[17] The Commission's REMI model was obtained from Regional Economic Models, Inc. which is a private modeling firm located in Amherst, Massachusetts. The model was originally developed for the State of Massachusetts in the mid-1970s and has been sold and leased to private users since 1980. The model is referred to as a "hybrid" model since it contains both input-output relationships as well as econometric equations. The model is the most sophisticated large-scale regional economic model in use in America today. As well as serving the U.S. market, the model is also being calibrated and sold in Europe.

projects that the area's population will increase by 1,253 in 2004 and decline slightly with the decline in employment from 2004 to 2010. Because employment

Table 7: Impact on Hampton Roads of the Addition of One Thousand Military Personnel

One Thousand Military Added in 2004

	2004	2007	2010
Gross Regional Product (Chained 2004$)	$125,620,000	$115,680,000	$110,020,000
Population	1,253	1,257	1,195
Labor Force	352	410	393
Employment			
Military	1,000	1,000	1,000
Retail Trade	129	104	90
Construction	107	67	48
State and Local Government	76	77	74
Eating and Drinking	61	51	47
Miscellaneous Business Services	57	45	38
Miscellaneous Professional Services	29	22	18
Wholesale Trade	21	16	13
Personal Services	21	17	14
Manufacturing	20	13	11
Real Estate	20	13	9
Amusements and Recreation	19	17	16
Medical	16	13	11
Transportation and Public Utilities	15	13	11
Banking	14	10	1
Other	89	67	68
Total	1,694	1,545	1,469
Per Capita Income (2004$)	$17.11	$11.73	$10.55
Local Government			
Revenues	$4,137,414	$4,427,094	$4,630,629
Expenditures	$4,133,106	$4,326,946	$4,273,102
Revenues Minus Expenditures	$4,308	$100,148	$357,527
State Government			
Revenues	$8,040,065	$7,318,549	$7,040,710
Expenditures	$3,899,420	$4,102,953	$4,054,493
Revenues Minus Expenditures	$4,140,645	$3,215,596	$2,986,217

is projected to expand by more than the increase in the labor force, the regional unemployment rate is projected to decline in the simulation. Per capita income is projected to grow slightly.

The increase in the number of military personnel assigned to the area will generate new revenues for state and local governments while increasing the demand for public services. However, as can be seen in Table 7, the growth in revenues will exceed the growth in expenditures so that the net impact on both levels of government is positive. State government will reap the bigger benefit over the 2004 to 2010 period. For example, in 2004, the increase in economic

activity in the region will produce a net positive fiscal impact of just over four thousand dollars for area local governments combined as opposed to over four million dollars in net new revenue for the State of Virginia. While the fiscal impacts change by 2010, the State of Virginia continues to experience a much larger positive impact than do the local governments in Hampton Roads.

Two other simulations were designed to examine the military impact of each side of Hampton Roads on the other. The first assumed the addition of one thousand military personnel to the Peninsula and estimated economic impacts upon the area's sub regional economies. The other assumed the addition of one thousand military personnel on South Hampton Roads and again estimated economic impacts on each side of the harbor. The results for three critically important variables are shown in Table 8 for the years 2004 and 2010.

Table 8: Impact on Each Side of Hampton Roads of the Addition of One Thousand Military Personnel

One thousand Military Added in 2004

2004

	Impact from an Increase of One Thousand Military Personnel on South Hampton Roads			Impact from an Increase of One Thousand Military Personnel on the Peninsula		
	South Hampton Roads	Peninsula	Hampton Roads	South Hampton Roads	Peninsula	Hampton Roads
Gross Regional Product (Chained 2004$)	$124,992,000	$3,625,760	$128,617,760	$9,347,120	$115,729,200	$125,076,320
Employment	1,648	53	1,701	137	1,527	1,664
Population	1,236	19	1,255	48	1,196	1,244

2010

	Impact from an Increase of One Thousand Military Personnel on South Hampton Roads			Impact from an Increase of One Thousand Military Personnel on the Peninsula		
	South Hampton Roads	Peninsula	Hampton Roads	South Hampton Roads	Peninsula	Hampton Roads
Gross Regional Product (Chained 2004$)	$109,702,800	$2,914,000	$112,616,800	$7,596,240	$101,816,400	$109,412,640
Employment	1,436	35	1,471	94	1,364	1,458
Population	1,136	64	1,200	160	1,013	1,173

Several observations can be made from the simulation results. First, the addition of one thousand military will have a larger impact on the regional economy when the increase occurs on South Hampton Roads as opposed to the Peninsula. For example, in 2004 the addition of one thousand military on South Hampton Roads caused regional employment to increase by 1,701 while a similar military increase on the Peninsula generated an increase of just 1,662 jobs region wide. The primary explanation for the larger increase when the military are added to South Hampton Roads is that the south side economy is bigger and therefore has more inter-industry linkages than does the Peninsula. As a result, the multiplier for South Hampton Roads is larger than the corresponding multiplier for the Peninsula. The effect of this larger multiplier can be seen in the table since one thousand new military added to South Hampton

Roads produces 1,648 jobs there while one thousand new military added to the Peninsula produces only 1,527 new jobs north of the James River. Furthermore, because the South Hampton Roads economy is more "complete" having more inter-industry linkages, it is more self-sufficient and needs fewer imports of goods and services from the Peninsula and as a result produces only 53 new jobs on the Peninsula. The opposite is true of the Peninsula. Its economy is less self-sufficient and therefore is more dependent on South Hampton Roads, and, as a result, imports more from the south side creating 137 new jobs on South Hampton Roads in the process. Furthermore, of all the jobs created in the region, only 3.1 percent of the jobs are created on the Peninsula when the one thousand military are added to South Hampton Roads. By contrast, when the one thousand military are added to the Peninsula, 8.2 percent of the new jobs created are located across the harbor in South Hampton Roads.

A second observation, which can be made from the table, is that the population response differs between the two sides based upon where the new military jobs are added. For example, when the one thousand military are added to South Hampton Roads, the population on the south side increased by 1,236 in 2004 as compared to an increase of 19 on the Peninsula. The difference is that an increase in the number of military personnel will produce a large increase in population since many military personnel will bring family members with them. By contrast, the 53 new jobs created on the Peninsula were civilian jobs – many of which were filled from the existing population so only 19 new residents were added on the Peninsula. These dynamics work in reverse when the military are added to the Peninsula. The one thousand military added to the Peninsula caused its population to increase by 1,196 while only creating an increase of 48 persons in South Hampton Roads.

Finally, adding population occurs with a lag or delay when civilian jobs are created as opposed to the population response associated with the addition of military personnel. For example, in the South Hampton Roads simulation that assumed an increase of one thousand military personnel on the south side, from 2004 to 2010, the relationship between the growth in population and the growth in jobs changes little since the new military personnel bring with them a change in population (the military plus their families). In fact, the ratio of population increase to the growth in new jobs increases from 0.75 (1,236/1,648) in 2004 to only 0.79 (1,136/1,436) in 2010. In other words, in 2004, for each new job created in South Hampton Roads, 0.75 people were added to the population while each new job in 2010 produced an increase of 0.79 people. The arrival of military personnel produced an immediate increase in population. By contrast, in 2004 an increase of 53 new civilian jobs on the Peninsula produced an increase of only 19 new residents for a ratio of 0.36 people added for each new job. The low rate of population creation reflects the fact that population growth responds only slowly to a change in civilian jobs while the response is immediate with an increase in military jobs. However, by 2010, sufficient time has passed to allow the population to adjust to an increase in jobs and the ratio of new population to

new jobs on the Peninsula increases to 1.83. These results are for the addition of one thousand military on the south side. Similar results were obtained for the Peninsula.

Conclusion

Hampton Roads has been critically important to the defense of the nation for many decades. Today, the presence of defense spending in the region's economy accounts for approximately thirty percent of all jobs in the economy. Unfortunately, this dependency on defense and the corresponding lack of diversification in the regional economy has led to several problems of considerable importance. Principal among these difficulties has been the loss of military personnel that has occasioned a reduction in wages and incomes for residents of the region. Additionally, area businesses have suffered from the loss of customers during periods of deployment producing a slowdown in the area's economy. These and other negative regional economic effects can be mitigated, in part, by diversifying the economy so that defense spending accounts for a smaller percent of all spending. The prospects for diversifying the economy appear good since the region has many natural and cultural advantages along with a work force that has an abundance of technical skills. The only missing piece is an action plan that can produce a more diversified regional economy. This document will serve along with a benchmarking study as the foundation for later work that will develop a set of recommendations for diversifying and, more importantly, strengthening the regional economy.

Several concerns about the regional economy have emerged from the work done for this report. First, it is clear that changes in military activity levels impact all of the communities in Hampton Roads. Some are affected more than others, but the region's inter-industry linkages are sufficiently strong so that all communities are ultimately impacted by changes in military activity – no matter from which community the initial "shock" to the economy occurs. Second, Hampton Roads needs to improve its mix of industries. For years, the region has had a mix of industries which has been characterized by lower than average pay and below average rates of growth. This has kept area incomes below the national average and has led to significant net out-migration of population along with a "brain drain" of college and university graduates. Finally, the South Hampton Roads economy has, for many years, grown somewhat more slowly than has the Peninsula economy. This slower growth has been the result of a slight disadvantage in the south side's sector mix and industry competitiveness. Increasing transportation access to the Peninsula and points beyond should help to enhance the competitive position of the south side and lead to an overall improvement in the regional economy. Additional analytical work is expected to identify strategies that can be employed to strengthen the regional economy and reduce the impacts generated by unfavorable changes in local military activity.

APPENDICES

Appendix A - 1

Shift-Share Analysis

	U.S.				Hampton Roads				Shift Share Components		
			Change				Change		National	Mix	Competitive
	1970	1980	Percent	Absolute	1970	1980	Percent	Absolute	Component	Component	Component
Farm	3,978.0	3,798.0	-4.5%	-180.0	8.6	4.5	-47.9%	-4.1	2.2	-2.6	-3.7
Lumber	701.0	809.7	15.5%	108.8	2.9	2.7	-5.7%	-0.2	0.7	-0.3	-0.6
Furniture	493.1	477.0	-3.3%	-16.1	0.3	0.4	18.0%	0.1	0.1	-0.1	0.1
Stone, Clay, Glass	649.0	665.8	2.6%	16.8	1.7	1.9	10.8%	0.2	0.4	-0.4	0.1
Primary Metals	1,362.8	1,154.5	-15.3%	-208.3	0.8	1.2	49.0%	0.4	0.2	-0.3	0.5
Fabricated Metals	1,534.9	1,632.6	6.4%	97.8	1.2	1.6	32.0%	0.4	0.3	-0.2	0.3
Machinery and Computers	2,114.5	2,549.1	20.6%	434.6	1.5	2.8	95.9%	1.4	0.4	-0.1	1.1
Electrical Equipment	1,805.4	1,829.7	1.3%	24.3	0.3	1.0	254.8%	0.7	0.1	-0.1	0.7
Motor Vehicles	920.5	798.9	-13.2%	-121.6	1.1	2.4	115.1%	1.3	0.3	-0.4	1.5
Other Transportation	1,408.6	1,097.8	-22.1%	-310.8	24.7	28.5	15.2%	3.7	6.3	-11.8	9.2
Instruments	645.6	978.2	51.5%	332.7	0.6	0.8	40.2%	0.2	0.1	0.1	-0.1
Miscellaneous Manufacturi	483.5	499.2	3.2%	15.7	1.4	0.9	-37.3%	-0.5	0.4	-0.3	-0.6
Food	1,812.7	1,724.0	-4.9%	-88.7	13.0	16.4	26.5%	3.4	3.3	-3.9	4.1
Tobacco	81.1	67.4	-16.9%	-13.7	0.0	0.0	0.0%	0.0	0.0	0.0	0.0
Textiles	1,014.4	857.1	-15.5%	-157.3	0.6	0.7	19.6%	0.1	0.1	-0.2	0.2
Apparel	1,429.3	1,291.6	-9.6%	-137.7	1.4	1.4	2.3%	0.0	0.4	-0.5	0.2
Paper	714.0	686.1	-3.9%	-27.9	0.8	1.0	14.4%	0.1	0.2	-0.2	0.2
Printing	1,148.8	1,342.3	16.8%	193.5	2.7	4.0	47.2%	1.3	0.7	-0.2	0.8
Chemicals	1,068.7	1,122.2	5.0%	53.5	3.8	2.4	-37.0%	-1.4	1.0	-0.8	-1.6
Petroleum	187.2	198.7	6.1%	11.5	0.3	0.3	14.8%	0.0	0.1	-0.1	0.0
Rubber	624.0	754.7	21.0%	130.8	1.3	1.4	6.0%	0.1	0.3	-0.1	-0.2
Leather	347.1	244.5	-29.6%	-102.6	0.0	0.0	0.0%	0.0	0.0	0.0	0.0
Mining	734.5	1,277.6	73.9%	543.1	0.1	0.2	83.7%	0.1	0.0	0.0	0.0
Construction	4,470.8	5,654.2	26.5%	1,183.4	26.2	35.7	36.3%	9.5	6.7	0.3	2.6
Transportation and Utilities	4,795.9	5,672.1	18.3%	876.2	21.8	26.3	20.6%	4.5	5.5	-1.6	0.5
FIRE	5,906.0	8,736.7	47.9%	2,830.7	22.8	39.9	75.0%	17.1	5.8	5.1	6.2
Retail	13,449.7	17,878.6	32.9%	4,428.9	65.8	90.4	37.3%	24.6	16.7	4.9	2.9
Wholesale	4,097.1	5,747.1	40.3%	1,650.0	15.1	22.6	50.0%	7.5	3.8	2.2	1.5
Services	16,732.0	25,018.9	49.5%	8,286.9	79.7	124.5	56.1%	44.7	20.3	19.2	5.2
Agriculture etc.	506.2	909.0	79.6%	402.8	2.2	3.8	71.6%	1.6	0.6	1.2	-0.2
Federal Civilian	2,919.0	2,994.0	2.6%	75.0	58.7	54.3	-7.5%	-4.4	14.9	-13.4	-5.9
Military	3,419.0	2,501.0	-26.8%	-918.0	144.7	119.9	-17.1%	-24.8	36.8	-75.7	14.1
State and Local	9,503.0	13,263.0	39.6%	3,760.0	45.8	68.5	49.4%	22.7	11.7	6.5	4.5
Total	91,057.2	114,231.2	25.5%	23,174.1	551.8	662.1	20.0%	110.4	140.4	-73.6	43.5
Percent of Total Change	NA	NA	NA	NA	NA	NA	NA	NA	127.3%	-66.7%	39.5%

Appendix A - 2

Shift-Share Analysis

	U.S.				Hampton Roads				Shift Share Components		
			Change				Change		National	Mix	Competitive
	1980	1990	Percent	Absolute	1980	1990	Percent	Absolute	Component	Component	Component
Farm	3,798.0	3,153.0	-17.0%	-645.0	4.5	2.6	-40.8%	-1.8	1.0	-1.7	-1.1
Lumber	809.7	860.3	6.2%	50.6	2.7	2.4	-13.5%	-0.4	0.6	-0.4	-0.5
Furniture	477.0	535.4	12.2%	58.4	0.4	0.6	40.8%	0.2	0.1	0.0	0.1
Stone, Clay, Glass	665.8	610.5	-8.3%	-55.3	1.9	2.6	36.9%	0.7	0.4	-0.6	0.9
Primary Metals	1,154.5	758.9	-34.3%	-395.6	1.2	1.8	47.2%	0.6	0.3	-0.7	1.0
Fabricated Metals	1,632.6	1,444.1	-11.5%	-188.5	1.6	1.6	1.1%	0.0	0.3	-0.5	0.2
Machinery and Computers	2,549.1	2,138.4	-16.1%	-410.7	2.8	3.4	20.6%	0.6	0.6	-1.1	1.0
Electrical Equipment	1,829.7	1,699.3	-7.1%	-130.4	1.0	1.6	64.0%	0.6	0.2	-0.3	0.7
Motor Vehicles	798.9	825.7	3.4%	26.8	2.4	2.7	8.8%	0.2	0.5	-0.5	0.1
Other Transportation	1,097.8	1,183.8	7.8%	86.0	28.5	31.1	9.3%	2.6	6.3	-4.0	0.4
Instruments	978.2	991.6	1.4%	13.4	0.8	2.6	227.5%	1.8	0.2	-0.2	1.8
Miscellaneous Manufacturi	499.2	445.7	-10.7%	-53.5	0.9	0.6	-27.9%	-0.2	0.2	-0.3	-0.2
Food	1,724.0	1,677.2	-2.7%	-46.8	16.4	11.5	-29.7%	-4.9	3.6	-4.1	-4.4
Tobacco	67.4	50.5	-25.1%	-16.9	0.0	0.0	-66.7%	0.0	0.0	0.0	0.0
Textiles	857.1	704.1	-17.9%	-153.0	0.7	0.5	-26.2%	-0.2	0.2	-0.3	-0.1
Apparel	1,291.6	1,086.0	-15.9%	-205.6	1.4	1.4	-0.6%	0.0	0.3	-0.5	0.2
Paper	686.1	698.2	1.8%	12.1	1.0	1.1	13.4%	0.1	0.2	-0.2	0.1
Printing	1,342.3	1,700.9	26.7%	358.6	4.0	5.0	26.0%	1.0	0.9	0.2	0.0
Chemicals	1,122.2	1,098.6	-2.1%	-23.6	2.4	1.7	-26.1%	-0.6	0.5	-0.6	-0.6
Petroleum	198.7	156.7	-21.1%	-42.0	0.3	0.4	23.5%	0.1	0.1	-0.1	0.1
Rubber	754.7	892.8	18.3%	138.1	1.4	2.0	38.0%	0.5	0.3	-0.1	0.3
Leather	244.5	138.5	-43.4%	-106.0	0.0	0.0	-100.0%	0.0	0.0	0.0	0.0
Mining	1,277.6	1,044.1	-18.3%	-233.5	0.2	0.4	159.8%	0.3	0.0	-0.1	0.3
Construction	5,654.2	7,260.8	28.4%	1,606.6	35.7	49.0	37.5%	13.4	7.9	2.3	3.2
Transportation and Utilities	5,672.1	6,568.6	15.8%	896.5	26.3	33.1	25.9%	6.8	5.8	-1.6	2.6
FIRE	8,736.7	10,712.6	22.6%	1,975.9	39.9	50.1	25.7%	10.2	8.8	0.2	1.2
Retail	17,878.6	22,920.5	28.2%	5,042.0	90.4	138.5	53.2%	48.1	19.9	5.6	22.6
Wholesale	5,747.1	6,711.5	16.8%	964.5	22.6	28.7	27.2%	6.1	5.0	-1.2	2.3
Services	25,018.9	38,709.6	54.7%	13,690.7	124.5	202.2	62.5%	77.7	27.5	40.7	9.6
Agriculture etc.	909.0	1,453.0	59.8%	544.0	3.8	6.1	62.4%	2.4	0.8	1.4	0.1
Federal Civilian	2,994.0	3,233.0	8.0%	239.0	54.3	59.7	9.9%	5.4	12.0	-7.6	1.1
Military	2,501.0	2,718.0	8.7%	217.0	119.9	142.7	19.0%	22.8	26.4	-16.0	12.4
State and Local	13,263.0	15,245.0	14.9%	1,982.0	68.5	81.9	19.6%	13.4	15.1	-4.9	3.2
Total	114,231.2	139,426.9	22.1%	25,195.7	662.1	869.8	31.4%	207.6	146.0	0.0	61.6
Percent of Total Change	NA	NA	NA	NA	NA	NA	NA	NA	70.3%	0.0%	29.7%

Appendix A - 3

Shift-Share Analysis
Analysis Uses Employment Data for 1990 and 2000

	U.S.				Hampton Roads				Shift Share Components		
			Change				Change		National	Mix	Competitive
	1990	2000	Percent	Absolute	1990	2000	Percent	Absolute	Component	Component	Component
Farm	3,153.0	3,103.0	-1.6%	-50.0	3.0	2.5	-15.6%	-0.5	0.6	-0.7	-0.4
Lumber	860.3	930.1	8.1%	69.8	2.8	2.0	-29.7%	-0.8	0.6	-0.3	-1.1
Furniture	535.4	597.6	11.6%	62.2	0.6	0.4	-38.9%	-0.2	0.1	-0.1	-0.3
Stone, Clay, Glass	610.5	606.5	-0.7%	-4.0	2.6	2.4	-10.1%	-0.3	0.5	-0.5	-0.2
Primary Metals	758.9	707.5	-6.8%	-51.4	1.8	2.7	52.3%	0.9	0.4	-0.5	1.1
Fabricated Metals	1,444.1	1,596.4	10.5%	152.3	1.6	2.2	40.5%	0.6	0.3	-0.2	0.5
Machinery and Computers	2,138.4	2,144.0	0.3%	5.6	3.4	8.5	146.4%	5.0	0.7	-0.7	5.0
Electrical Equipment	1,699.3	1,742.7	2.6%	43.4	1.6	2.3	48.5%	0.8	0.3	-0.3	0.7
Motor Vehicles	825.7	1,020.9	23.6%	195.2	2.7	3.4	26.4%	0.7	0.5	0.1	0.1
Other Transportation	1,183.8	844.6	-28.7%	-339.2	31.1	22.7	-26.9%	-8.4	6.3	-15.2	0.5
Instruments	991.6	845.9	-14.7%	-145.7	2.6	1.2	-52.8%	-1.4	0.5	-0.9	-1.0
Miscellaneous Manufacturing	445.7	489.5	9.8%	43.8	0.6	1.6	152.4%	1.0	0.1	-0.1	0.9
Food	1,677.2	1,730.7	3.2%	53.5	11.5	11.3	-2.1%	-0.2	2.3	-2.0	-0.6
Tobacco	50.5	35.7	-29.3%	-14.8	0.0	0.0	100.0%	0.0	0.0	0.0	0.0
Textiles	704.1	542.2	-23.0%	-161.9	0.5	0.4	-24.1%	-0.1	0.1	-0.2	0.0
Apparel	1,086.0	686.9	-36.7%	-399.1	1.4	0.9	-39.5%	-0.6	0.3	-0.8	0.0
Paper	698.2	661.5	-5.3%	-36.7	1.1	1.3	18.3%	0.2	0.2	-0.3	0.3
Printing	1,700.9	1,656.0	-2.6%	-44.9	5.0	5.6	10.5%	0.5	1.0	-1.1	0.7
Chemicals	1,098.6	1,055.7	-3.9%	-42.9	1.7	1.1	-36.6%	-0.6	0.4	-0.4	-0.6
Petroleum	156.7	126.9	-19.0%	-29.8	0.4	0.4	10.2%	0.0	0.1	-0.2	0.1
Rubber	892.8	1,016.2	13.8%	123.4	2.0	1.7	-13.2%	-0.3	0.4	-0.1	-0.5
Leather	138.5	73.4	-47.0%	-65.1	0.0	0.0	0.0%	0.0	0.0	0.0	0.0
Mining	1,044.1	795.4	-23.8%	-248.7	0.4	0.4	-17.8%	-0.1	0.1	-0.2	0.0
Construction	7,260.8	9,604.3	32.3%	2,343.5	49.0	56.5	15.3%	7.5	9.9	5.9	-8.3
Transportation and Utilities	6,568.6	8,250.1	25.6%	1,681.5	33.1	39.5	19.4%	6.4	6.7	1.8	-2.0
FIRE	10,712.6	13,500.1	26.0%	2,787.5	50.1	63.7	27.1%	13.6	10.1	2.9	0.5
Retail	22,920.5	27,350.1	19.3%	4,429.6	138.5	160.2	15.7%	21.7	27.9	-1.1	-5.0
Wholesale	6,711.5	7,588.9	13.1%	877.4	28.7	31.2	8.8%	2.5	5.8	-2.0	-1.2
Services	38,709.6	53,301.7	37.7%	14,592.1	202.2	272.4	34.7%	70.2	40.7	35.5	-6.0
Agriculture etc.	1,453.0	2,166.8	49.1%	713.8	6.1	9.1	48.9%	3.0	1.2	1.8	0.0
Federal Civilian	3,233.0	2,891.0	-10.6%	-342.0	59.7	46.8	-21.6%	-12.9	12.0	-18.3	-6.6
Military	2,718.0	2,075.0	-23.7%	-643.0	142.7	111.3	-22.0%	-31.4	28.7	-62.5	2.3
State	4,404.0	4,952.0	12.4%	548.0	19.7	22.8	15.5%	3.1	4.0	-1.5	0.6
Local	10,841.0	12,822.0	18.3%	1,981.0	62.2	78.7	26.6%	16.6	12.5	-1.2	5.2
Total	139,426.9	167,511.3	20.1%	28,084.4	870.7	967.3	11.1%	96.6	175.4	-63.3	-15.5
Percent of Total Change	NA	NA	NA	NA	NA	NA	NA	NA	181.5%	-65.5%	-16.0%

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Shift-Share Analysis

	U.S.				Hampton Roads				Shift Share Components		
			Change				Change		National	Mix	Competitive
	1970	2000	Percent	Absolute	1970	2000	Percent	Absolute	Component	Component	Component
Farm	3,978.0	3,103.0	-22.0%	-875.0	8.6	2.3	-73.4%	-6.3	7.2	-9.1	-4.4
Lumber	701.0	930.1	32.7%	229.1	2.9	1.4	-50.8%	-1.5	2.4	-1.5	-2.4
Furniture	493.1	597.6	21.2%	104.5	0.3	0.3	-2.0%	0.0	0.3	-0.2	-0.1
Stone, Clay, Glass	649.0	606.5	-6.5%	-42.5	1.7	2.4	36.3%	0.6	1.4	-1.6	0.7
Primary Metals	1,362.8	707.5	-48.1%	-655.3	0.8	2.7	234.1%	1.9	0.7	-1.1	2.3
Fabricated Metals	1,534.9	1,596.4	4.0%	61.6	1.2	2.2	87.4%	1.0	1.0	-1.0	1.0
Machinery and Computers	2,114.5	2,144.0	1.4%	29.5	1.5	8.5	482.2%	7.0	1.2	-1.2	7.0
Electrical Equipment	1,805.4	1,742.7	-3.5%	-62.6	0.3	2.3	764.1%	2.1	0.2	-0.2	2.1
Motor Vehicles	920.5	1,020.9	10.9%	100.4	1.1	3.4	195.7%	2.2	1.0	-0.8	2.1
Other Transportation	1,408.6	844.6	-40.0%	-564.0	24.7	22.7	-8.0%	-2.0	20.8	-30.7	7.9
Instruments	645.6	845.9	31.0%	200.3	0.6	1.2	116.9%	0.7	0.5	-0.3	0.5
Miscellaneous Manufacturi	483.5	489.5	1.2%	6.0	1.4	1.6	14.1%	0.2	1.2	-1.2	0.2
Food	1,812.7	1,730.7	-4.5%	-82.0	13.0	11.3	-12.9%	-1.7	10.9	-11.5	-1.1
Tobacco	81.1	35.7	-56.0%	-45.4	0.0	0.0	0.0%	0.0	0.0	0.0	0.0
Textiles	1,014.4	542.2	-46.5%	-472.2	0.6	0.4	-33.0%	-0.2	0.5	-0.8	0.1
Apparel	1,429.3	686.9	-51.9%	-742.4	1.4	0.9	-38.4%	-0.5	1.2	-1.9	0.2
Paper	714.0	661.5	-7.4%	-52.5	0.8	1.3	53.6%	0.5	0.7	-0.8	0.5
Printing	1,148.8	1,656.0	44.2%	507.2	2.7	5.6	104.9%	2.9	2.3	-1.1	1.7
Chemicals	1,068.7	1,055.7	-1.2%	-13.0	3.8	1.1	-70.5%	-2.6	3.2	-3.2	-2.6
Petroleum	187.2	126.9	-32.2%	-60.3	0.3	0.4	56.1%	0.2	0.2	-0.3	0.2
Rubber	624.0	1,016.2	62.9%	392.3	1.3	1.7	27.0%	0.4	1.1	-0.3	-0.5
Leather	347.1	73.4	-78.9%	-273.7	0.0	0.0	0.0%	0.0	0.0	0.0	0.0
Mining	734.5	795.4	8.3%	60.9	0.1	0.4	292.4%	0.3	0.1	-0.1	0.3
Construction	4,470.8	9,604.3	114.8%	5,133.5	26.2	56.5	116.2%	30.4	22.0	8.1	0.3
Transportation and Utilities	4,795.9	8,250.1	72.0%	3,454.2	21.8	39.5	81.2%	17.7	18.3	-2.6	2.0
FIRE	5,906.0	13,500.1	128.6%	7,594.1	22.8	63.7	179.5%	40.9	19.1	10.2	11.6
Retail	13,449.7	27,350.1	103.4%	13,900.4	65.8	160.2	143.4%	94.4	55.3	12.8	26.4
Wholesale	4,097.1	7,588.9	85.2%	3,491.8	15.1	31.2	107.6%	16.2	12.6	0.2	3.4
Services	16,732.0	53,301.7	218.6%	36,569.7	79.7	272.4	241.6%	192.7	67.0	107.3	18.4
Agriculture etc.	506.2	2,166.8	328.1%	1,660.6	2.2	9.1	314.9%	6.9	1.9	5.4	-0.3
Federal Civilian	2,919.0	2,891.0	-1.0%	-28.0	58.7	46.8	-20.3%	-11.9	49.3	-49.8	-11.3
Military	3,419.0	2,075.0	-39.3%	-1,344.0	144.7	111.3	-23.1%	-33.4	121.5	-178.3	23.5
State and Local	9,503.0	17,774.0	87.0%	8,271.0	45.8	101.5	121.5%	55.7	38.5	1.4	15.8
Total	91,057.2	167,511.3	84.0%	76,454.1	551.8	966.4	75.1%	414.6	463.3	-154.1	105.4
Percent of Total Change	NA	NA	NA	NA	NA	NA	NA	NA	111.7%	-37.2%	25.4%

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Major DoD Expenditures in 2002

Air Force

	Federal Civilan Pay	Active Duty Military Pay	Inactive Duty Military Pay	Total Pay	Military Retirement and Disability Payments	Procurements	Total
Chesapeake	$0	$172,000		$172,000	$7,143,000	$32,518,000	$39,833,000
Franklin	$0	$0	$0	$0	$248,000	$0	$248,000
Gloucester Co.	$0	$0	$0	$0	$4,766,000	$0	$4,766,000
Hampton	$77,682,000	$330,916,000	$2,538,000	$411,136,000	$73,255,000	$94,983,000	$579,374,000
Isle of Wight Co.	$0	$0	$0	$0	$3,614,000	$0	$3,614,000
James City Co.	$0	$0	$0	$0	$633,000	$0	$633,000
Newport News	$136,000	$190,000	$0	$326,000	$30,293,000	$15,327,000	$45,946,000
Norfolk	$259,000	$15,835,000	$1,266,000	$17,360,000	$3,897,000	$3,540,000	$24,797,000
Poquoson	$0	$0	$0	$0	$123,000	$0	$123,000
Portsmouth	$0	$935,000	$0	$935,000	$2,554,000	$117,000	$3,606,000
Southampton Co.	$0	$0	$0	$0	$209,000	$0	$209,000
Suffolk	$97,000	$3,718,000		$3,815,000	$2,556,000	$3,330,000	$9,701,000
Surry Co.	$0	$0	$0	$0	$274,000	$0	$274,000
Virginia Beach	$0	$98,000	$1,612,000	$1,710,000	$15,540,000	$2,703,000	$19,953,000
Williamsburg	$0	$51,000	$0	$51,000	$16,077,000	$922,000	$17,050,000
York Co.	$0	$135,000	$0	$135,000	$41,055,000	$190,000	$41,380,000
Total	$78,174,000	$352,050,000	$5,416,000	$435,640,000	$202,237,000	$153,630,000	$791,507,000

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Major DoD Expenditures in 2002

Army

	Federal Civilan Pay	Active Duty Military Pay	Inactive Duty Military Pay	Total Pay	Military Retirement and Disability Payments	Procurements	Total
Chesapeake	$130,000	$0	$0	$130,000	$9,958,000	$2,763,000	$12,851,000
Franklin	$0	$0	$0	$0	$370,000	$0	$370,000
Gloucester Co.	$43,000	$0	$0	$43,000	$6,547,000	$173,000	$6,763,000
Hampton	$53,181,000	$33,845,000	$0	$87,026,000	$34,486,000	$181,569,000	$303,081,000
Isle of Wight Co.	$0	$0	$0	$0	$3,396,000	$145,000	$3,541,000
James City Co.	$0	$0	$739,000	$739,000	$927,000	$7,000	$1,673,000
Newport News	$73,082,000	$202,335,000	$8,464,000	$283,881,000	$51,726,000	$111,658,000	$447,265,000
Norfolk	$12,375,000	$10,500,000	$10,254,000	$33,129,000	$7,401,000	$13,619,000	$54,149,000
Poquoson	$0	$1,386,000		$1,386,000	$0	$92,000	$1,478,000
Portsmouth	$0	$35,000	$1,409,000	$1,444,000	$4,280,000	$3,103,000	$8,827,000
Southampton Co.	$0	$0	$0	$0	$312,000	$0	$312,000
Suffolk	$0	$875,000	$1,446,000	$2,321,000	$3,505,000	$2,802,000	$8,628,000
Surry Co.	$0	$0	$0	$0	$316,000	$21,000	$337,000
Virginia Beach	$0	$32,970,000	$4,599,000	$37,569,000	$26,195,000	$22,573,000	$86,337,000
Williamsburg	$0	$280,000	$231,000	$511,000	$25,643,000	$2,364,000	$28,518,000
York Co.	$0	$910,000		$910,000	$17,085,000	$831,000	$18,826,000
Total	$138,681,000	$283,136,000	$27,142,000	$448,959,000	$182,189,000	$338,957,000	$970,105,000

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Major DoD Expenditures in 2002

Navy

	Federal Civilan Pay	Active Duty Military Pay	Inactive Duty Military Pay	Total Pay	Military Retirement and Disability Payments	Procurements	Total
Chesapeake	$21,507,000	$13,843,000	$0	$35,350,000	$91,574,000	$130,810,000	$257,734,000
Franklin	$0	$0	$0	$0	$824,000	$0	$824,000
Gloucester Co.	$0	$63,000	$0	$63,000	$6,588,000	$154,000	$6,805,000
Hampton	$327,000	$500,000	$0	$827,000	$18,001,000	$7,720,000	$26,548,000
Isle of Wight Co.	$0	$0	$0	$0	$4,821,000	$0	$4,821,000
James City Co.	$0	$0	$0	$0	$368,000	$87,000	$455,000
Newport News	$0	$44,896,000	$605,000	$45,501,000	$20,148,000	$1,847,829,000	$1,913,478,000
Norfolk	$0	$2,018,109,000	$11,876,000	$2,029,985,000	$102,510,000	$1,481,477,000	$3,613,972,000
Poquoson	$0	$0	$0	$0	$16,000	$138,000	$154,000
Portsmouth	$388,374,000	$127,549,000	$0	$515,923,000	$23,909,000	$202,171,000	$742,003,000
Southampton Co.	$0	$0	$0	$0	$1,085,000	$135,000	$1,220,000
Suffolk	$9,028,000	$1,474,000	$0	$10,502,000	$15,446,000	$101,660,000	$127,608,000
Surry Co.	$0	$0	$0	$0	$766,000	$0	$766,000
Virginia Beach	$0	$726,360,000	$671,000	$727,031,000	$391,398,000	$405,117,000	$1,523,546,000
Williamsburg	$2,886,000	$5,910,000	$0	$8,796,000	$19,953,000	$8,438,000	$37,187,000
York Co.	$28,055,000	$38,275,000	$0	$66,330,000	$7,876,000	$17,848,000	$92,054,000
Total	$428,670,000	$2,963,136,000	$13,152,000	$3,404,958,000	$613,709,000	$4,072,774,000	$8,091,441,000