# The Hampton Roads Economy

## - Analysis and Strategies -

## Part 2: Hampton Roads Cluster Study

December 2004

HAMPTON ROADS
PLANNING DISTRICT COMMISSION

E04-03

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# The Hampton Roads Economy
## - Analysis and Strategies -

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This report was prepared by the staff of the Hampton Roads Planning District Commission

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# EXECUTIVE SUMMARY

In an effort to create a better blend of economic drivers in the region, this investigation scans the region's economic environment to identify economic clusters that can be encouraged to locate/expand in Hampton Roads and produce a variety of positive benefits for the region's economy.

While there is no single definition of what constitutes an industry cluster, the fundamental notion is that a cluster is a geographical concentration of industries that have co-located in order to gain performance advantages or efficiencies.

## Identification of Clusters in Hampton Roads

Hampton Roads has worked for many years to develop its regional economy. That effort has, in large part, been successful. However, the region continues to have incomes and wages which are a fraction of comparable U.S. statistics, and the region's rate of long-term regional economic growth has been below the national average. Identifying and then promoting the growth of selected industry clusters may help to strengthen the regional economy and improve its standard of living. It is for this reason that the current study has been undertaken.

Most methods used to identify clusters rely upon an eclectic collection of quantitative and qualitative techniques since no single method can deal with the many complexities of a large regional economy. This study is no exception since the methodology used here took a multifaceted approach to identifying economic clusters.

## Selected Candidate Clusters

This study identified ten candidate clusters, eight of which already have a strong regional presence while two do not have a strong presence but are growing rapidly in the region. These ten clusters were selected for further review by several study groups whose mission was to select a smaller number of clusters that, if encouraged to expand locally, could produce important and positive impacts upon the regional economy.

The ten candidate clusters recommended for further study are listed below.

Motor Vehicles and Parts

The automobile industry has had a significant presence in Hampton Roads in recent years. The industry employed, between truck assembly and parts manufacturing, nearly thirty-two hundred workers in 2001 producing output valued a $1.5 billion in 2002 (1996 dollars).

Key to the success of the local industry has been the presence of the Ford Motor Co.'s Norfolk Assembly Plant. Norfolk Assembly produces several versions of the F-Series pickup and is the company's lead facility for the manufacturing of pickups. It is also the company's most efficient plant. In recognition of its high level of productivity, the plant was picked by Ford for a $375 million retooling of its manufacturing system several years ago.

Not surprisingly, parts and supplier companies have located or expanded in Hampton Roads because of the presence of Norfolk Assembly. In fact, because of the state's favorable location near the Southeast, 117 auto and parts makers have built or expanded facilities in Virginia since 1993. In addition, total auto investments made in Virginia during the past decade were over $2.1 billion with over $627 million having been invested since 2001.

Growth in the industry has been substantial in recent years with constant dollar output growing by 7.7 percent in Hampton Roads over the period from 1970 to 2000 as compared to 5.1 percent nationally. Not only has the local sector grown faster than the same sector nationally, but it has grown faster than the Hampton Roads economy overall. The sector's constant-dollar output grew by 7.7 percent annually from 1970 to 2000 while the region's overall output grew by just 3.7 percent. Furthermore, the industry is projected to continue to grow at rates near to the rate of growth for the economy overall.

Ship and Boat Building

The ship and boat building industry is much smaller than the automobile industry nationally since it employed only 139 thousand in 2001. By contrast, the shipbuilding industry is several times larger than the auto industry in Hampton Roads. Employment in the area's private shipyards is slightly over twenty thousand civilian workers according to County Business Patterns. Unfortunately, this estimate fails to include the several thousand federal civilian employees doing ship repair work at the Norfolk Naval Shipyard in Portsmouth.

Growth in the industry in Hampton Roads has been modest in recent years. From 1970 to 2000, output grew at 3.6 percent annually. This compares to 3.7 percent for the regional economy overall. All of this growth was achieved

through increases in productivity since the industry lost over eight hundred jobs annually, on average, during the 1990s due to reductions in DoD spending.

The industry's difficulties in the decade of the 1990s were driven largely by cuts in defense expenditures. However, defense spending began to increase in constant dollar terms in 1998 and the increase since then has been substantial. Little of that increase so far has been spent on shipbuilding since U.S. shipyards are continuing to build ships at below the replacement rate. This has caused some to speculate that the industry will soon benefit from an increase in DoD spending as the nation attempts to rebuild and modernize its naval fleet. However, any increase in DoD shipbuilding activity is likely to be modest at best given the size of the nation's budget deficit, the high and continuing cost of the war in Iraq, the nation's need to add to its expenditures on homeland security and any efforts by the current Administration to privatize social security.

Electrical Equipment Manufacturing

Hampton Roads has seen considerable growth in the electrical equipment manufacturing over the years. In 2001, the sector was slightly smaller than the motor vehicle industry employing just over two thousand workers. However, while the industry is still small in Hampton Roads, growth has been rapid causing the industry's location quotient to increase from 0.03 in 1970 to 0.23 in 2000.

This pattern of rapid growth is expected to continue. For example, the Bureau of Labor Statistics projects that the industry's employment will expand by 7.4 percent annually from 2002 to 2012 as compared to the U.S. which is expected to expand by just 1.5 percent annually overall.

Tourism

Large numbers of travelers visit Virginia each year making tourism one of several important economic engines in the state. In 2002, for example, tourists spent $14 billion in the state making Virginia tenth among all states in total traveler spending. Many of the state's tourist assets are located in Hampton Roads which caused the region to receive 18.7 percent of the state's travel spending in 2000.

In Hampton Roads, the tourism industry has been regarded as one of the mainstays of the regional economy since industry employment was 42 thousand in 2001.

The cluster has expanded over the years in response to the economic growth that has occurred in the markets which send travelers to Hampton Roads. However, growth in output appears to have been less than for the regional economy overall since hotel output (the best proxy available for the entire cluster) grew by 2.6 percent from 1970 to 2000. This compares to 3.7 percent for the

regional economy overall. By contrast, the Bureau of Labor Statistics projects an acceleration in cluster growth from 2002 to 2012 since hotel output is expected to expand by 4.1 percent annually as compared to the historical growth rate of 2.6 percent.

Port/Trucking and Warehousing

Today, in large part because of its deep, ice-free harbor, central location, modern equipment for handling large vessels and a soft bottom for easy dredging, the Port of Virginia, has become one of the leading ports in the nation.

Port expansion and modernization is an ongoing process at the Port of Virginia. Examples of recent activity have been the purchase of new cranes for the Norfolk and Portsmouth marine terminals and the dredging of the harbor channels to a depth of fifty feet. The Norfolk International Terminals South is also undergoing a $279 million expansion.

Of critical importance to the port's future is that new container capacity will soon be added by the A. P. Moller Group. This Danish conglomerate announced that it would build a $450 million cargo terminal in Portsmouth on a 575-acre site located on the Elizabeth River to replace its 71-acre facility near the Portsmouth Marine Terminal. This expansion is expected to increase the port's capacity by fifty percent. This increase in capacity is badly needed because the Virginia Port Authority's state-run terminals are operating at or near capacity. The new terminal is expected to begin operations in 2007.

Longer term, the opening of Craney Island in 2017 will further increase the capacity of the region's port and help to insure continued growth of the Port of Virginia. VPA's fourth terminal is projected to be constructed near the new APM Terminal atop an eastward expansion of the Craney Island dredge-disposal site. Craney Island will boost port capacity so that the Port of Hampton Roads will be able to handle the projected growth in cargo through the year 2035.

The long-term health of the port rests, in part, upon the development of a third crossing between the Peninsula and South Hampton Roads and a related connector road from Interstate 564. Additionally, improvements to route 460 must be made to give South Hampton Roads and its port facilities better access to the outside world. The port's ability to grow is threatened if congestion in the region worsens significantly.

In Hampton Roads, the cluster employed nearly twenty-one thousand workers in 2001. Cluster output grew by 3.3 percent annually over the 1970 to 2000 period as compared to the 3.7 percent for the regional economy overall.

Senior Industries

The American population is aging. In fact, the elderly age cohorts are now among the nation's most rapidly growing. Virginia is participating in the aging trend

Many of the states and communities to which these retirees have moved have experienced significant and positive economic impacts from retiree migration. As a result, a growing number of states, especially in the Southeast and Southwest, and some communities as well have begun to recruit these older migrants, both as tourists and prospective residents. In addition, individual companies, mostly those in the business of developing new residential communities, have also begun their own marketing programs designed to convert distant retirees into customers for their products. The magnitude of this effort to tap into the retirement market has been growing, and it may be time for Hampton Roads to begin recruiting retirees as residents, especially those with substantial financial resources.

Over the years, states and communities have come to recognize the benefits which they can derive from attracting retirees – especially those who are affluent. These communities hope to benefit from the fact that retirees increase local spending, have spending patterns which do not respond significantly to the business cycle, invest in local thrift institutions, volunteer their time and money to local charitable institutions, produce a net positive impact on state and local governments, use only limited public services, and do not contribute substantially to local crime, pollution, or congestion.

Aware of these benefits along with the recognition that migrating retirees are "fanning out" to a wider variety of retirement destinations than was the case just a few years ago, many states and communities have begun to actively recruit persons fifty-five years of age and older. For example, in 1998, North Carolina, South Carolina, Alabama, Louisiana, Mississippi, Arkansas, New Mexico, Florida, and Pennsylvania were all actively recruiting retirees. In addition, Idaho, Texas, Washington, and Tennessee were considering the development of programs designed to market to seniors.

Information Technology

Information technology (IT) cluster is comprised of two very different components – manufacturing and computer services.

Information technology has been a large and successful cluster in Hampton Roads for many years since the region employed nearly ten thousand persons in the cluster in 2001. Furthermore, the cluster has grown rapidly in Hampton Roads, in large part, because of the presence of the area's military facilities and defense contractors.

At present, the region has a large number of civilian workers in information technology professions. In fact in 2001, the region had 3,330 computer systems analysts, 3,210 computer programmers, 2,420 computer software engineers (applications), 2,250 computer support specialists, 1,250 computer software engineers (systems software), and 1,230 network and computer systems administrators, 850 database administrators, 730 communications analysts, and 190 computer and information research scientists for a total of over fifteen thousand persons working directly in computer-based information technology.

Technical Services

The technical services cluster, as defined here, includes firms which do engineering design and analysis as well as scientific research and testing.

The hallmark of any successful cluster is that it has an abundant supply of suitable labor. In the case of technical services, the region is well endowed with the sorts of occupations required by the cluster. In addition to having a large number of computer specialists, the region also has a disproportionately large number of persons working in the areas of science and engineering. In fact, the region ranked 33 out of 317 MSAs in 2001 in the number of persons in architectural and engineering occupations. Hampton Roads has above average representation in seven of the twelve engineering occupations in the Bureau's database. Finally, the region has an above average representation in physicists, atmospheric and space scientists, environmental scientists, and zoologists and wildlife biologists.

Currently, there are 425 firms populating this cluster. These firms employ over twelve thousand workers. Because production costs are well below the U.S. average, the cluster has grown at nearly double the region's average growth rate over the thirty year period from 1970 to 2000.

Modeling and Simulation

Hampton Roads has developed significant capability in the field of computer modeling and simulation (M&S) in recent years. This capability has been developed, in large part, to meet the needs of the area's military facilities, defense contractors, and federal labs. In order to enhance the region's efforts in modeling and simulation, Old Dominion University has created the Virginia Modeling, Analysis, and Simulation Center (VMASC). Also to support the cluster, the university has created one of the country's most successful graduate programs in modeling and simulation and has recently graduated the nation's first PhD. in the field. The cluster's success can also be attributed to the presence of its large supply of technical workers. Future growth in modeling and simulation is likely as various agencies of the federal government and others discover and find uses for M&S technology.

At present, the size, character, and future of the M&S cluster in Hampton Roads are not well known. For that reason, a study has been conducted to assess the nature of M&S in the region. Results of that analysis are expected by early 2005.

Sensors

The information revolution was spawned by the advent of computer technology. That revolution is continuing, in part, because sensors (small devices that can supply information on things that move, grow, make noise, and heat up) are being manufactured which can collect information for computer processing that had not formerly been available. In essence, the advent of sensors, has made computers more useful while computers in turn have made sensors more useful. The industry which manufactures sensors is expected to grow at or above average growth rate for the U.S. economy.

Hampton Roads is positioned to "ride" the wave of an accelerating demand for sensors since segments of the industry are already located in the region. In the future, sensors will be produced by firms dedicated to the manufacture of sensors as their primary line of business while sensors will also be produced by user industries.

Currently, sensor producers are located in Hampton Roads in large part to meet the needs of the region's defense contractors, national labs and, most especially, military facilities since the American military is among the largest users of sensors.

## Conclusions

This report has described the Commission's efforts to identify clusters which might be further developed in Hampton Roads. Each of the clusters identified in this analysis are currently present in Hampton Roads although some are larger and better developed than others.

The methodology for selecting clusters began by identifying the universe of candidate clusters. From that universe, each cluster was examined in detail and ten where selected for discussion here.

These clusters were then presented to a steering committee of the Hampton Roads Partnership. The Partnership is currently working to selected a small number of these candidate clusters which can be promoted regionally. A short list of final target clusters along with recommended actions for further developing each cluster is expected by the middle of 2005.

# INTRODUCTION

The economy of Hampton Roads continues to be heavily dependent upon the activities of the Department of Defense (DoD). As a result, changes in those activities can produce large socio-economic impacts on the Hampton Roads area – some of which are undesirable. In an effort to create a better blend of economic drivers in the region, this investigation scans the region's economic environment in an effort to identify economic clusters that can be encouraged to locate/expand in Hampton Roads and produce a variety of positive benefits for the region's economy. This document will identify those clusters, which have the potential to further grow and develop in Hampton Roads. The results of this effort will be provided to the Hampton Roads Partnership so that it can select final target clusters from those outlined here.

## Clusters in the Economy

While there is no single definition of what constitutes an industry cluster, the fundamental notion is that a cluster is a geographical concentration of industries that have co-located in order to gain performance advantages or efficiencies. These efficiencies arise from the fact that a company's success depends in part on the competitiveness of its suppliers, service providers, and even competitors. Traditionally, the firms populating a cluster buy and sell to each other and utilize common technologies, occupations and infrastructure. Example of clusters include auto making in Detroit, banking in Charlotte, information technology in Austin, movie making in Hollywood, and shipbuilding in Hampton Roads.

Industry clusters are frequently classified into either of two categories: existing or emerging.[1] Existing clusters are those that are large in absolute and relative terms. By contrast, emerging clusters are those that have not achieved critical mass but are likely to do so at some future date should current trends continue.

Two further categories have been used to classify clusters. The first, and the most common form of business cluster, is the value-chain cluster. Value chains are groups of businesses that buy and sell to each other. Value chain clusters are usually contrasted with another cluster type referred to by analysts as labor pool clusters. Labor pool clusters are firms that utilize a similar mix of occupations and worker skills. Occasionally, a cluster can be thought of as a hybrid belonging to both cluster types.

[1] Some analysts also refer to "potential clusters" which they define to be either a collection of very small enterprises which have few if any products or, more commonly, a large collection of firms which do not have strong buyer-seller relationships.

A further dichotomy sometimes used when describing clusters is the number of primary driver industries making up the cluster. Some clusters are simple in their construction since they contain a single primary driver while others are more complex containing several large driver industries. Both are clusters since they have backward and forward linkages, which connect them to other industries in the region.[2]

It should be noted that industry clusters differ significantly from trade associations, which typically have a narrower membership and focus. Trade associations frequently include members of a single industry that devote their efforts to lobbying. By contrast, clusters include a wider assortment of industries and commonly address a broader range of issues including workforce recruitment and training, the development of infrastructure and educational institutions, and the promotion of local academic research, which can further cluster objectives.

## Clusters as an Economic Development Tool

Efforts to promote the development of local, regional, and state clusters have accelerated recently. For many years, regional economic development efforts included industrial recruitment, entrepreneurial and small business development, along with business retention and expansion programs. However, more recently, an interest in the development of industry clusters has also become one of the centerpieces of regional development efforts.[3]

This growing interest in clusters stems in large part from the publication of Michael Porter's *Competitive Advantages of Nations* (Porter, 1990). In his book Porter developed what he called the "Diamond of Advantages" or the four key determinants of competitiveness. Many have used his "diamond" to identify local industry clusters. Porter asserts throughout his work that the competitiveness of a region is based on the competitiveness of its industries and that industries are most productive and competitive when they are embedded in a deep and supporting local network.

Since the publication of Porter's work, the concept of clusters has captured the imagination of policy makers, researchers, and practitioners. Numerous cluster studies have been done by states, regions, and cities – many of which can be found through a search of the web. Arizona, California,

[2] A driver industry has forward linkages to its customers through its sales and backward linkages to suppliers through its purchases.

[3] Developing regional clusters differs in some ways from the more traditional methods of economic development in that it takes a strong supply-side approach to develoment. While business recruitment is a component of any effort to build a cluster, other efforts center on developing a nurturing environment in which the cluster can growth. Those efforts include such things as building good local schools and transportation systems, establishing business networks within the cluster, training the workforce, configuring the tax system in ways that will enable the cluster to grow, streamlining regulations, and providing expertise and capital.

Connecticut, Florida, Minnesota, and North Carolina are just a few of the states that have or are currently implementing a cluster-based approach to economic development.

Finally, most states and regions, which are working to promote clusters, recognize that development efforts need to be industry driven. Industries in a cluster must identify critical issues faced by its members along with solutions to common problems. While government is generally considered to be critical to the success of a cluster, it is usually viewed as playing a supporting role since its function is to facilitate the solution to problems identified by the private sector.

## Methods Commonly Used to Identify Clusters

Because of the interest in promoting clusters, a variety of techniques have been developed which identify the presence of clusters in area economies. These methods vary greatly in terms of their data requirements as well as complexity of analysis.

Perhaps the most common approach employed to identify clusters is to query regional experts as the existence of local clusters. These experts, normally industry leaders, public officials, economists, and development officials, possess knowledge of both the structure and trends in the local economy and are frequently in a position to provide detailed information on area clusters. Surveying experts has the advantage of being relatively quick and cost effective to implement and can yield a rich supply of information about the local economy. However, the technique is only as good as the experts who are interviewed. If those experts are biased or have only a very limited knowledge of their area, then the results that are obtained may be of limited value. In general, the more complex the local economy, the less reliable this method is.

Another commonly used procedure to identify clusters and one that is only slightly more rigorous is the use of location quotients (LQs). A location quotient is simply a ratio of a region's share of economic activity in an industry divided by a reference area's share of economic activity in the same industry. This computation yields a value from zero to infinity although most values tend to range between zero and five with higher values occurring only rarely.[4] When using location quotients, values exceeding 1.25 are commonly regarded as an indication of regional specialization. This is important since the presence of regional specialization frequently suggests the existence of a cluster. Analysts using location quotients usually supplement their efforts with other types of information since LQs offer no information about interdependencies between sectors.

[4] Since regional or local share numbers are always positive, negative location quotients are not possible.

While location quotients can be used to select clusters when they are supplemented with other data that account for industry interdependences, their use has generally been confined to finding clusters in smaller economies with only a few industries. For larger economies where the interindustry linkages are more numerous and complex, a top-down approach is more commonly used. This approach generally relies on the use of data reduction techniques such as statistical cluster analysis or factor/principal component analysis to identify sectors with common characteristics. The presence of sectors with common characteristics may suggest that firms in the sector have sufficiently strong linkages so as to make them members of the same cluster.[5]

Finally, input-output (I/O) tables are particularly effective at identifying value-chain clusters since they supply information on buyer-seller or interindustry linkages. Analysts typically prefer to work with regional tables when searching for linkages although regional tables have their limitations since they do not have information on industries that are not in the region. A good example of the input-output approach to clustering is the work by Feser and Bergman that factor analyzed the U.S. I/O table to construct value-chain "templates" in an effort to identify industry clusters in North Carolina (Feser and Bergman, 1999).

## THE METHODS USED TO IDENTIFY CLUSTERS IN HAMPTON ROADS

Hampton Roads has worked for many years to develop its regional economy. That effort has, in large part, been successful. However, the region continues to have incomes and wages, which are a fraction of comparable U.S. statistics, and the region's rate of long-term regional economic growth has been below the national average. Identifying and then promoting the growth of selected industry clusters may help to strengthen the regional economy and improve its standard of living. It is for this reason that the current study has been undertaken.

Most methods used to identify clusters rely upon an eclectic collection of quantitative and qualitative techniques since no single method can deal with the many complexities of a large regional economy. The methodology used here, like so many others employed elsewhere, takes a multifaceted approach.

[5] Cluster studies have used both techniques. A primary difference between the two techniques is that statistical cluster analysis produces clusters which contain mutually exclusive groups of industries. By contrast, factor analysis does not classify industries exclusively into a single cluster. Many regard factor analysis as more realistic since industries frequently have trading arrangements with a large number of industries and therefore may appropriately be put into several different clusters. In addition, factor analysis allows the analyst to separate industries into those which are the primary industries in the cluster and those which are secondary or less important to the cluster. For example, sectors that have their highest factor loading on a particular cluster might be regarded as a primary industry whereas those with loadings of 0.3 to 0.6 might also be regarded as members of the cluster though of secondary importance. Rules regarding the use of the results from factor analysis are not hard and fast giving the analyst considerable room to interpret the results.

## Identification of Candidate Clusters

A multi-step process was used to identify potential target clusters for Hampton Roads. In the first phase, a list was prepared of the clusters currently existing in the region. From this list candidate clusters were selected. Those candidate clusters were then passed along to a study group for further evaluation.

The first step in preparing this list was to review all of the clusters that have been identified in six earlier studies done for the region. Of those studies, four listed clusters for Hampton Roads while two identified clusters for Virginia. These investigations included those reported on the websites for the Hampton Roads Economic Development Alliance, the Peninsula Alliance for Economic Development, and the Virginia Economic Development Partnership, as well as work done by the Wadley-Donovan consulting firm for the Hampton Roads Economic Development Alliance, a study done by the RTI Center for Technology Applications and International Development for the Hampton Roads Partnership, and an investigation done Chimura Economics and Analytics for the Virginia Center for Innovative Technology. The clusters selected in these studies were included in the list of potential clusters from which candidate clusters could be identified. The six studies identifying clusters are shown in Table 1. An "x" in each column indicates that the cluster was selected as a target by the study.

In addition to the clusters identified from other, earlier studies, other clusters were identified from a review of the new technologies currently being used by commercial enterprises in Hampton Roads. The objective of this review was to determine whether or not those technologies along with their users have the potential to develop into new and significant regional industries. Those technologies with the potential for further growth in the region were added to the clusters already identified from the six existing cluster studies described above.

Finally, an independent investigation was conducted to identify which industries have been growing rapidly in the region and appear to have a comparative advantage when operating in Hampton Roads. Checks were also conducted to determine whether or not these potential clusters have strong local interindustry linkages so as to insure that the region possesses an adequate supply chain to support each cluster. Several industries meeting these and other criteria were added to the list of candidate clusters.

## Cluster Evaluation

In the second phase of this effort, each of the clusters identified using the methods outlined above was examined to determine whether or not it has the potential to expand in the region and, through that expansion, strengthen the regional economy. Each cluster's potential was assessed by reviewing its past

and projected economic performance, both in Hampton Roads and at the national level, as well as other indicators of importance such as wages, cluster size, and comparative advantage in the region. These and other statistical indicators were used to measure the ability of each cluster to succeed in Hampton Roads and to generate positive economic impacts in the process.

**Table 1: Hampton Roads Clusters**

(Cluster Industries Selected by Each Alliance Are Indicated with an "X.")

| | Hampton Roads | | | | Virginia | |
|---|---|---|---|---|---|---|
| | Regional Alliances | | | | | |
| Clusters | Hampton Roads Economic Development Alliance | Peninsula Alliance for Economic Development | Wadley-Donovan Group, Ltd. | RTI Centers for Tech Appls and International Development[4] | Virginia Economic Development Partnership | Chmura Economics & Analytics[3] |
| High&Info Tech/Software/Telecomms[1] | X | X | X | X | X | X |
| Automobiles and Parts | X | X | X | - | X | - |
| Wholesale Packaging/Distribution | X | - | X | - | X | - |
| Food Processing | X | - | X | - | X | - |
| Bioscience | - | - | - | X | X | X |
| Financial Services | - | X | - | - | X | - |
| Production/Assembly and Testing | X | - | X | - | - | - |
| Maritime Related Operations | X | - | X | - | - | - |
| Technical Support Centers | X | - | X | - | - | - |
| Defense Contractors/Homeland Security[2] | X | X | - | - | - | - |
| Shipbuilding and Repair | X | - | - | X | - | - |
| Aerospace | - | - | - | X | X | X |
| Construction | - | X | - | - | - | - |
| Health Care | - | X | - | - | - | - |
| Hospitality | - | X | - | - | - | - |
| Precision Manufacturing | - | X | - | - | - | - |
| Business Services | X | - | - | - | - | - |
| Education and Knowledge Creation | X | - | - | - | - | - |
| Engineering, Research, and Management S | - | - | X | - | - | - |
| Communications Equipment Manufacturing | - | - | X | - | - | - |
| Production Machinery and Equipment | - | - | X | - | - | - |
| Depot and Repair | - | - | X | - | - | - |
| Mini-Steel Mills | - | - | X | - | - | - |
| Photonics | - | - | X | - | - | - |
| Chemical Processing | - | - | X | - | - | - |
| Electronics | - | - | - | - | X | - |
| Microelectronics | - | - | - | - | X | - |
| Motorsports | - | - | - | - | X | - |
| Plastics | - | - | - | - | X | - |
| Modeling and Simulation | - | - | - | X | - | - |
| Sensors | - | - | - | X | - | - |

[1] The Peninsula Alliance has designed "information technology" as their cluster.
[2] The Peninsula Alliance has designed "security" as their cluster.
[3] "Identifying High-Tech Growth Opportunities in Virginia," CIT, October, 2000.
[4] "Technology Commercialization Assessment, Phase 2: Identifying Opportunities," HRP, March, 2002

## Measures Used to Evaluate Clusters

Some but not all of the variables used in the cluster evaluation process are listed and defined below. Much of this data came from the Commission's REMI model, which was calibrated for Hampton Roads by Regional Economic Models, Inc. Each indicator was used to assess the desirability of the clusters.

Employment. Employment is an important economic indicator since it provides a measure of the size of each cluster. Furthermore, employment

is the primary means by which an economic enterprise injects money into a local economy. Additionally, when changes in local cluster employment increase faster than similar changes in a larger reference economy, the local cluster is assumed to be competitive. Employment data for Hampton Roads are shown in Appendix A. The role of labor costs in the output of U.S. industries is also contained in the appendix.

Location Quotients. A location quotient is a cluster's share of regional economic activity divided by the cluster's share of economic activity in a larger reference area. High values for the location quotient indicate that the cluster is geographically concentrated in the region. In practice, a value of 1.25 or more is frequently used to identify local concentrations of economic activity. While the value of LQs is most commonly used to assess a cluster, changes in the location quotient over time can also be important. An increase in the location quotient indicates that the cluster is becoming more important to the region; a decrease indicates that the activity is becoming less important. Hampton Roads location quotients based upon employment are shown in Appendix B. Location quotients computed from occupational data are also contained in the appendix.

Relative Cost of Labor/Production. A cluster's relative cost of labor and production are indications of its competitiveness. Values below one indicate that costs are below the national average and that the local industry has a cost advantage.

Wages Per Hour. The level of wages suggests the extent to which a cluster is regionally competitive. Furthermore, wages are the principal source of income for most workers, and, as such, they play a central role in determining a worker's standard of living.

Regional Purchase Coefficient. A regional purchase coefficient is the percent of a cluster's non-labor inputs that are purchased locally. Coefficients range from zero to one hundred percent. Higher coefficients suggest that a cluster will have a large impact on the regional economy relative to its size. Regional purchase coefficients for Hampton Roads are shown in Appendix C.

Import Substitution. Import substitution is an economic development strategy. The strategy entails substituting goods or services produced locally for those that are imported. This substitution creates local economic growth by increasing the local spending stream, which results from reducing the leakage of money to locations beyond the borders of the region. The value of imports suggests the extent to which an opportunity

may exist to expand local cluster output.[6] Imports were classified by type of user with final users being those who consume the product and intermediate users being those who utilize the product in their production processes. Hampton Roads commodity imports are shown in Appendix D.[7]

Economic Integration. Backward linkages indicate the increase in dollars in the production of inputs in Virginia that would occur as a result of a one-dollar increase in output from the cluster in Virginia. A forward linkage is the dollar increase in the production of Virginia buyers of cluster products for each dollar of output purchased from the cluster in Virginia. Strong forward linkages indicate that a good market for the output of the cluster exists in Virginia. High values for backward linkages suggest that changes in cluster output will have a significant impact on the state's economy.

Cluster Impacts. Knowledge of impacts is central to any cluster study in order to insure that the effect of the cluster on the local economy will be the one desired by the community. The potential impact of each cluster including the impact on area wages and per capita income along with the net fiscal effect on local governments were estimated using the Commission's REMI model.

Projected National Growth. A region's industry or cluster growth is shaped, in part, by changes in the same industry nationally as well as by changes in the macroeconomic environment. Therefore, national trends and projections provide a good indication of an industry's local growth potential. It is for this reason that national economic trends and forecasts were examined in order to get a first approximation as to a cluster's potential for growth in the region.

Projected Regional Growth. Not only are national growth projections important, but regional projections, to the degree that they are available, suggest the extent to which local cluster growth may occur. Projections of cluster growth in Hampton Roads were obtained from Regional Economic Models, Inc, while national projections were acquired from the Bureau of Labor Statistics. The pace of historical growth can also suggest the likelihood of future growth.

These and the other indicators, which were used to assess the desirability of each candidate, cluster.

[6] A certain level of importation is common to all regional economies. The goal of import substitution is not to eliminate all imports but instead to substitute local production for imports when locally made goods are cost competitive with imports.

[7] Commodity imports are the imports of the primary output from each industry. Industry imports are the imports purchased by each industry.

## SELECTED CANDIDATE CLUSTERS

The methodology described above produced a short list of ten candidate clusters, eight of which already have a strong regional presence while two do not have a strong presence but are growing rapidly in the region. These ten clusters were selected for further review by several study groups whose mission was to select a smaller number of clusters that, if encouraged to expand locally, could produce important and positive impacts upon the regional economy.

The ten candidate clusters recommended for further study are listed below. Statistical characteristics of each of these clusters are provided in Table 2. The potential impact of each cluster upon the regional economy is shown in Table 3, which was prepared by assuming that area initiatives would produce a fifteen percent increase in the growth amount projected for Hampton Roads by REMI for the 2004 to 2012 period.[8]

### Motor Vehicles and Parts

#### Background

The automobile industry is one of the nation's largest since it employed over one million workers in 2001. The industry's annual payroll in the same year was $49 billion.

The automobile industry is largely an assembly business requiring the utilization of many thousands of components. In fact, the manufacturing of these components is so important that 7 out of 10 establishments in the industry manufacture parts and accessories as opposed to finished vehicles. In addition, 54 percent of the industry's jobs are located in parts-making facilities while 35 percent are in plants assembling vehicles and making car bodies. Employment in the remainder of the industry is devoted to making truck and bus bodies, truck trailers, and motor homes (U.S. Dept. of Labor, 2002).

The location of the industry's operations was historically concentrated in and around Detroit. However, geographical changes have occurred over the years so that many more regions of the nation now contribute to the industry's production. While nearly one-third of all the industry's jobs are still located in Michigan, the industry has constructed branch plants in the southern states in recent years in response to locational shifts in the nation's population and because of other advantages offered by those areas including such things as lower taxes and cheaper labor (Dicken, 2003).

[8] A uniform fifteen percent was used for all clusters since differentiating the impacts of various strategic initiatives was not possible.

## Table 2: Hampton Roads Cluster Candidates

| Cluster Characteristics | Clusters: Existing: Motor Vehicles Mfg. | Ship and Boat Building and Repair[6] | Electrical Equipment Mfg. | Tourism[7] | Port/ Trucking and Warehousing[4] | Senior Industries | Information Technology[8] | Technical Services | Emerging: Modeling & Simulation | Sensors |
|---|---|---|---|---|---|---|---|---|---|---|
| 2001 Employment | 3,271 | 20,003 | 2,227 | 42,000 | 20,750 | NA | 9,900 | 12,443 | NA | 1,400 |
| Number of Firms | 14 | 42 | 20 | 1,000s | 234 | 1,000s | 425 | 444 | NA | 20 |
| Location Quotients | | | | | | | | | | |
| 1970 L.Q. | 0.23 | 7.11 | 0.03 | NA | 0.95 | NA | 0.39 | 0.76 | NA | 0.05 |
| 2000 L.Q. | 0.57 | 23.36 | 0.23 | NA | 1.02 | NA | 0.67 | 1.27 | NA | 0.12 |
| Change in L.Q. | 0.34 | 16.25 | 0.20 | NA | 0.07 | NA | 0.28 | 0.51 | NA | 0.18 |
| Relative Cost of Production | 100.4% | 94.4% | 99.0% | 94.0% | 99.0% | NA | 93.4% | 94.0% | NA | 95.8% |
| Relative Labor Cost | 88.1% | 92.7% | 75.8% | 85.0% | 100.0% | NA | 76.8% | 87.2% | NA | 65.6% |
| Relative Input Cost | 104.5% | 94.0% | 106.3% | 95.0% | 95.0% | NA | 102.2% | 96.5% | NA | 108.2% |
| Availability of Labor | Good | Very Good | Good | Good | Good | Good | V. Good | Good | Good | Good |
| 2000 Wages Per Hour | | | | | | | | | | |
| Hampton Roads | $45.3 | $49.6 | $37.7 | NA | $28.3 | Modest | $30.7 | $30.7 | NA | $22.2 |
| U.S. | $55.6 | $52.2 | $55.9 | NA | $28.0 | Modest | $46.1 | $47.3 | NA | $39.4 |
| Hampton Roads Average | $21.8 | $21.8 | $21.8 | $21.8 | $21.8 | $21.8 | $21.8 | $21.8 | $21.8 | $21.8 |
| Regional Purchase Coefficient | 9.6% | 79.5% | 5.1% | 80%+ | 45.0% | NA | 41.1% | 66.5% | NA | 2.4% |
| Import Substitution Possibilities (millions 2001$)[1] | | | | | | | | | | |
| VA Intermediate Imports | $1,438.2 | $74.1 | $1,355.7 | NA | $424.7 | NA | $1,270.1 | $903.3 | NA | $2,144.3 |
| VA Final Demand Imports | $220.6 | $1,640.0 | $1,295.9 | NA | $722.9 | NA | $10,924.7 | $1,137.7 | NA | $1,245.2 |
| Total | $1,658.8 | $1,714.1 | $2,651.6 | NA | $1,147.6 | NA | $12,194.8 | $2,041.0 | NA | $3,389.5 |
| HR Intermediate Imports | $373.6 | $55.6 | $269.9 | NA | $130.9 | NA | $241.0 | $168.6 | NA | $402.6 |
| HR Final Demand Imports | $32.0 | $666.0 | $224.8 | NA | $224.5 | NA | $808.4 | $179.3 | NA | $251.3 |
| Total | $405.6 | $721.6 | $494.7 | NA | $355.4 | NA | $1,049.4 | $347.9 | NA | $653.9 |
| Potential No. of New Firms[5] | 4 | 6 | 12 | NA | 34 | NA | 405 | 97 | NA | 61 |
| Rest of VA Intermediate Imports | $1,064.6 | $18.5 | $1,085.8 | NA | $293.8 | NA | $1,029.1 | $734.7 | NA | $1,741.7 |
| Rest of VA Final Demand Imports | $188.6 | $974.0 | $1,071.1 | NA | $498.4 | NA | $10,116.3 | $958.4 | NA | $993.9 |
| Total | $1,253.2 | $992.5 | $2,156.9 | NA | $792.2 | NA | $11,145.4 | $1,693.1 | NA | $2,735.6 |
| Degree of Economic Integration | | | | | | | | | | |
| Backward Linkages to VA 2001 | 1.224 | 1.048 | 1.182 | NA | 1.280 | NA | 1.186 | 1.284 | NA | 1.169 |
| Forward Linkages to VA 2001 | 1.037 | 1.185 | 1.137 | NA | 1.250 | NA | 1.515 | 1.564 | NA | 1.038 |
| Total | 2.261 | 2.233 | 2.319 | NA | 2.530 | NA | 2.701 | 2.848 | NA | 2.207 |
| Output Growth Rates 1970 - 2000 | | | | | | | | | | |
| Hampton Roads Sector | 7.7% | 3.6% | 13.8% | 2.6% | 3.3% | NA | 11.9% | 6.3% | NA | NA |
| U.S. Sector | 5.1% | 2.3% | 7.2% | 2.6% | 3.4% | NA | 10.0% | 4.9% | NA | NA |
| Hampton Roads Overall | 3.7% | 3.7% | 3.7% | 3.7% | 3.7% | 3.7% | 3.7% | 3.7% | 3.7% | 3.7% |
| U.S. Overall | 3.4% | 3.4% | 3.4% | 3.4% | 3.4% | 3.4% | 3.4% | 3.4% | 3.4% | 3.4% |
| Relative Output Growth Rates 1970 - 2000 | | | | | | | | | | |
| HR Sector Minus U.S. Sector | 2.6% | 1.3% | 6.6% | 0.0% | -0.1% | NA | 1.9% | 1.4% | NA | NA |
| HR Sector Minus HR Overall | 4.0% | -0.1% | 10.1% | -1.1% | -0.4% | NA | 8.2% | 2.6% | NA | NA |
| HR Secotr Minus U.S. Overall | 4.3% | 0.2% | 10.4% | -0.8% | -0.1% | NA | 8.5% | 2.9% | NA | NA |
| Annual Job Change in 1990s | 70 | -838 | 31 | NA | 378 | NA | 600 | 586 | NA | NA |

## Table 2 Continued: Hampton Roads Cluster Candidates

| Cluster Characteristics | Clusters: Existing: Motor Vehicles Mfg. | Ship and Boat Building and Repair[6] | Electrical Equipment Mfg. | Tourism[7] | Port/ Trucking and Warehousing[4] | Senior Industries | Information Technology[8] | Technical Services | Emerging: Modeling & Simulation | Sensors |
|---|---|---|---|---|---|---|---|---|---|---|
| U.S. 2002-2012 Forecast (Ann. % Change) | | | | | | | | | | |
| Employment | | | | | | | | | | |
| Autos | -0.6% | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Parts | 0.4% | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Shipbuilding | NA | 1.3% | NA | NA | NA | NA | NA | NA | NA | NA |
| Electrical Equipment | NA | NA | 7.4% | NA | NA | NA | NA | NA | NA | NA |
| Hotels | NA | NA | NA | 1.6% | NA | NA | NA | NA | NA | NA |
| Water Transportation | NA | NA | NA | NA | -0.3% | NA | NA | NA | NA | NA |
| Trucking and Warehousing | NA | NA | NA | NA | 2.4% | NA | NA | NA | NA | NA |
| Senior Industries | NA | NA | NA | NA | NA | High | NA | NA | NA | NA |
| Computers and Data Processing | NA | NA | NA | NA | NA | NA | 4.2% | NA | NA | NA |
| Technical Services | NA | NA | NA | NA | NA | NA | NA | 1.5% | NA | NA |
| Modeling & Simulation | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Sensors | NA | NA | NA | NA | NA | NA | NA | NA | NA | -1.3% |
| Entire U.S. Economy | 1.5% | 1.5% | 1.5% | 1.5% | 1.5% | 1.5% | 1.5% | 1.5% | 1.5% | 1.5% |
| Output | | | | | | | | | | |
| Autos | 3.1% | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Parts | 3.9% | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Shipbuilding | NA | 1.1% | NA | NA | NA | NA | NA | NA | NA | NA |
| Electrical Equipment | NA | NA | 13.8% | NA | NA | NA | NA | NA | NA | NA |
| Hotels | NA | NA | NA | 4.1% | NA | NA | NA | NA | NA | NA |
| Water Transportation | NA | NA | NA | NA | 2.8% | NA | NA | NA | NA | NA |
| Trucking and Warehousing | NA | NA | NA | NA | 3.4% | NA | NA | NA | NA | NA |
| Senior Industries | NA | NA | NA | NA | NA | High | NA | NA | NA | NA |
| Computers and Data Processing | NA | NA | NA | NA | NA | NA | 9.7% | NA | NA | NA |
| Technical Services | NA | NA | NA | NA | NA | NA | NA | 4.5% | NA | NA |
| Modeling & Simulation | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Sensors | NA | NA | NA | NA | NA | NA | NA | NA | NA | 3.2% |
| Entire U.S. Economy | 3.3% | NA | 3.3% | 3.3% | 3.3% | 3.3% | 3.3% | 3.3% | 3.3% | 3.3% |
| Projected Output Growth in Hampton Roads (1996 million $) | | | | | | | | | | |
| 2002 Output | $1,491 | $5,208 | $860 | $2,496 | $2,414 | NA | $1,100 | $1,597 | NA | $214 |
| 2012 Output | $2,071 | $5,800 | $1,390 | $3,000 | $3,060 | NA | $1,907 | $2,227 | NA | $222 |
| Annual Growth Increment | $58 | $59 | $53 | $50 | $65 | NA | $81 | $63 | NA | $1 |
| Annual Percent Change | 3.9% | 1.1% | 6.2% | 2.0% | 2.7% | NA | 7.3% | 3.9% | NA | 0.4% |
| Projected Employment Growth in Hampton Roads | | | | | | | | | | |
| 2002 Employment | 3,215 | 23,170 | 2,101 | NA | 21,000 | NA | 10,273 | 12,555 | NA | 1,400 |
| 2012 Employment | 3,023 | 26,097 | 2,002 | NA | 21,300 | NA | 15,483 | 14,313 | NA | 1,456 |
| Annual Growth Increment | -19 | 293 | -10 | NA | 30 | NA | 521 | 176 | NA | 6 |
| Annual Percent Change | -0.6% | 1.3% | -0.5% | NA | 0.1% | NA | 5.1% | 1.4% | NA | 0.4% |
| Impact of One Hundred New Jobs[2,3] | | | | | | | | | | |
| Jobs | 339 | 275 | 262 | 191 | 253 | 277 | 185 | 201 | 180 | 202 |
| Annual Per Capita Income | $5.3 | $6.8 | $10.6 | $1.9 | $3.4 | $11.2 | $2.7 | $2.9 | $3.8 | $2.5 |
| Annual Average Wage | $4.6 | $7.6 | $3.2 | -$0.9 | $1.4 | -$0.5 | $1.7 | $2.1 | $3.5 | $0.8 |
| Net Fiscal Impact on Local Govt. | $481,200 | $340,000 | $503,000 | $224,000 | $333,000 | $780,400 | $227,000 | $220,000 | $200,100 | $311,000 |

[1] Values for Motor Vehicles include parts manufacturing only

[2] Senior Industries simulation assumed an increase of 100 retirees from 65 to 74 years of age with investment income which is $40,000 per retiree above the average for all retirees (net worth is much higher in order to generate the added investment income)

[3] The engineering and architectural industry was used to estimate the impact of the Modeling and Simulation cluster since a sector specific to M&S does not currently exist.

[4] Cluster defined to include all of transportation excluding pipelines and all of warehousing

[5] Estimate was developed by dividing the HR substitution value by output per firm

[6] Data for employment and number of firms exclude the Norfolk Naval Shipyard.

[7] Data for the cluster does not exist. Data on the hotel industry was used as a proxy instead. Cluster employment data was obtained from the Virginia Tourism Corporation.

[8] Data developed from County Business Patterns and REMI. Cluster includes computer and office equipment manufacturing and computer services and data processing.

## Table 3: Potential Impact of Hampton Roads Cluster Initiatives

(Calculations assume that regional initiatives will increase 2004 - 2012 growth amounts by 15% annually)

| | Clusters | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Existing | | | | | | | | Emerging | |
| Cluster Characteristics | Motor Vehicles Mfg. | Ship and Boat Building and Repair[5] | Electrical Equipment Mfg. | Tourism[6] | Port/ Trucking and Warehousing[4] | Senior Industries | Information Technology[7] | Technical Services | Modeling & Simulation | Sensors |
| 2001 Employment | 3,271 | 20,003 | 2,227 | 42,000 | 20,750 | NA | 9,900 | 12,443 | NA | 1,400 |
| Projected U.S. Annual Employment Growth Rate 2004 - 2012 | 0.4% | 1.3% | 7.4% | 1.6% | 2.0% | NA | 4.2% | 1.5% | NA | NA |
| HR Output Growth 1970-2000/ U.S. Output Growth 1970-2000 | 1.51 | 1.56 | 1.92 | 1.00 | 0.97 | NA | 1.19 | 1.29 | NA | NA |
| Projected HR Annual Employment Growth Rate 2004 - 2012 | 0.6% | 2.0% | 14.2% | 1.6% | 1.9% | NA | 5.0% | 1.9% | NA | NA |
| Projected Employment Growth 2004-2012 | 161 | 3,485 | 4,219 | 5,687 | 3,448 | NA | 4,725 | 2,062 | NA | NA |
| Fifteen Percent Increase in Cluster Employment Due to Regional Initiative 2004 - 2012 | 24 | 523 | 633 | 853 | 517 | NA | 709 | 309 | NA | NA |
| Impact of One Hundred New Jobs[2,3] | | | | | | | | | | |
| Jobs | 339 | 275 | 262 | 191 | 253 | 277 | 185 | 201 | 180 | 202 |
| Annual Per Capita Income | $5.3 | $6.8 | $10.6 | $1.9 | $3.4 | $11.2 | $2.7 | $2.9 | $3.8 | $2.5 |
| Annual Average Wage | $4.6 | $7.6 | $3.2 | -$0.9 | $1.4 | -$0.5 | $1.7 | $2.1 | $3.5 | $0.8 |
| Net Fiscal Impact on Local Govt. | $481,200 | $340,000 | $503,000 | $224,000 | $333,000 | $780,400 | $227,000 | $220,000 | $200,100 | $311,000 |
| Impact of Cluster Jobs Created by Regional Initiatives in 2012 | | | | | | | | | | |
| Jobs | 82 | 1,438 | 1,658 | 1,629 | 1,308 | NA | 1,311 | 622 | NA | NA |
| Annual Per Capita Income | $1.3 | $35.5 | $67.0 | $16.2 | $17.6 | NA | $19.1 | $9.0 | NA | NA |
| Annual Average Wage | $1.1 | $39.7 | $20.3 | -$7.7 | $7.2 | NA | $12.0 | $6.5 | NA | NA |
| Net Fiscal Impact on Local Govt. | $116,525 | $1,777,463 | $3,183,259 | $1,910,793 | $1,722,155 | NA | $1,608,720 | $680,394 | NA | NA |

[2] Senior Industries simulation assumed an increase of 100 retirees from 65 to 74 years of age with investment income which is $40,000 per retiree above the average for all retirees (net worth is much higher in order to generate the added investment income)

[3] The engineering and architectural industry was used to estimate the impact of the Modeling and Simulation cluster since a sector specific to M&S does not currently exist.

[4] Cluster defined to include all of transportation excluding pipelines and all of warehousing

[5] Data for employment excludes the Norfolk Naval Shipyard.

[6] Data for the cluster does not exist. Data on the hotel industry was used as a proxy instead. Cluster employment data was obtained from the Virginia Tourism Corporation.

[7] Data developed from County Business Patterns and REMI. Cluster includes computer and office equipment manufacturing and computer services and data processing.

The process of decentralization started in the 1970s when General Motors began building plants in lower-cost, nonunionized rural areas. Other automakers followed by building their own rural plants. This process included a move by Volkswagen to Pennsylvania, Honda to Ohio, Toyota to Kentucky, Nissan to Tennessee and Mitsubishi-Chrysler to Illinois. Many of these plants and their suppliers have located along and near interstates 65 and 75 in what has become America's new auto making corridor.

The proximity of suppliers to assembly plants has become increasing important with the passage of time. This has been especially true of the overseas automakers since they brought many of their suppliers with them and

have required them to locate in close proximity to their assembly facilities so as to make "just-in-time" assembly operations possible. In fact, in recent years, a rule of thumb has been that suppliers should locate within 250 miles of their assembly plant customers. Suppliers located farther away are expected to have a warehouse near to their customers so as to make quick delivery possible. (Wallace, 1996).

Selected Cluster Statistics

The automobile industry has had a significant presence in Hampton Roads in recent years. Truck assembly and parts manufacturing employed nearly thirty-two hundred workers in 2001 producing output valued a $1.5 billion in 2002 (1996 dollars).

Key to the success of the local industry has been the presence of the Ford Motor Co.'s Norfolk Assembly Plant. Norfolk Assembly produces several versions of the F-Series pickup and is the company's lead facility for the manufacturing of pickups. It is also the company's most efficient plant. In recognition of its high level of productivity, Ford picked the plant for a $375 million retooling of its manufacturing system several years ago. One result was that the plant's new production lines can be modified quickly to meet changes in the demand for vehicles. The flexibility of the new production system has caused some to speculate that Ford could, at some point, begin producing vehicles other than the plant's trademark pickups.

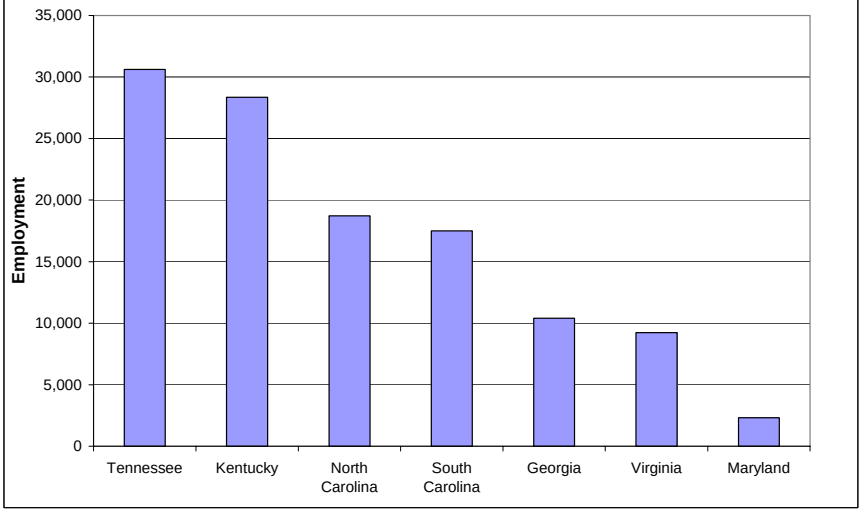
Not surprisingly, parts and supplier companies have located or expanded in Hampton Roads because of the presence of Norfolk Assembly. In fact, because of the state's favorable location near the Southeast, 117 auto and parts makers have built or expanded facilities in Virginia since 1993. In addition, total auto investments made in Virginia during the past decade were over $2.1 billion with over $627 million having been invested since 2001. Virginia's employment in motor vehicle parts manufacturing along with the state's close physical proximity to states in the Southeast with large concentrations of auto and parts making are shown in Figure 1. The state's close proximity to those other states with higher concentrations of auto making suggests that Virginia is under performing in parts manufacturing and that opportunities may exist to further expand this cluster in Hampton Roads.

A subsector within the automobile cluster that appears to be emerging in Hampton Roads is the motor sports or auto racing industry. Virginia currently has five major racetracks which together host top events for NASCAR, Grand Am, AMA, ARCA, IHRA, USCA and others. In addition to its racetracks, Virginia is home to a broad mix of motor sports businesses including builders of racing engines, car parts, and other racing-related enterprises. In addition, the presence of research facilities in the region, including the Langley Full Scale

Tunnel and other NASA wind tunnel facilities, make the area attractive to those needing to evaluate car and part design.

Growth in the industry has been substantial in recent years with constant dollar output growing by 7.7 percent in Hampton Roads over the period from 1970 to 2000 as compared to 5.1 percent nationally. Not only has the local sector grown faster than the same sector nationally, but also it has grown faster than the Hampton Roads economy overall. The sector's constant-dollar output grew by 7.7 percent annually from 1970 to 2000 while the region's overall output grew by just 3.7 percent. Furthermore, the industry is projected to continue to grow at a rate near to that of the overall economy.

**Figure 1: Employment in Motor Vehicle Parts Manufacturing 2001**




Part of the explanation for the industry's above average rate of growth in Hampton Roads is its below average cost of labor and above average productivity. Labor costs in the motor vehicle and parts industry in Hampton Roads are 88 percent of the industry average nationwide. Furthermore, the presence of large regional imports of vehicles and parts suggests that opportunities may exist to substitute local production for imports.

Finally, further growth in the industry has the potential to significantly impact upon the regional economy. For example, if it is assumed that regional efforts are successful in increasing the size of the cluster by fifteen percent by 2012, then the cumulative impact on Hampton Roads from 2004 to 2012 (including secondary impacts resulting from the multiplier process) will be as follows: 82 new jobs, $1.3 change in annual regional per capita income, $1.1 change in the average annual regional wage, and a $116,525 collective net fiscal impact on all of the local governments in Hampton Roads.

## Ship and Boat Building

### Background

During the 1980s, many shipyards were forced out of business because they were at a competitive disadvantage in the international market. Thousands of U.S. workers were laid off and by 1988 U.S. private shipbuilders no longer competed internationally in the constructing of commercial ships. In order to stay in business, the remaining shipyards were forced to rely upon building ships for the Navy.

The industry's lifeline since the gradual demise of the commercial shipbuilding business has been the construction of military ships, primarily U.S. Navy ships. Fortunately for the industry, the end of U.S. commercial shipbuilding subsidies coincided with the onset of the nation's peacetime military buildup. In fact, during the 1980s, the U.S. Navy commenced the largest ship construction program in peacetime history. Military construction continues to dominate the workload at U.S. yards, in most cases constituting more than 90 percent of total revenues.

Unfortunately, the pace of that activity has gradually declined. During the defense buildup, the goal of creating a 600-ship Navy led to the construction of an average of seventeen naval ships per year. However, the 1993 Bottom Up Review recommended a Navy of only 346 ships. As a result, the number of ships constructed each year declined. For example, in the 1990s, Navy ships were built at a rate of between four and five per year, significantly fewer than fifteen years earlier. By 2002, the Navy had 315 ships in the fleet, including 12 carriers and 12 amphibious groups, and was constructing new vessels at the rate of only five or six per year, roughly half the number needed to sustain the fleet. Shipyards will need to “ramp up” their construction if the current size of the fleet is to be maintained.

Area shipyards suffered as a result of the slow pace of naval ship construction. Some, in fact, have failed from lack of work. For example, the Jonathan Corp. of Norfolk went out of business in 1995. Later, Dreadnaught Marine of Norfolk, which once employed 500 workers, went out of business in 1998. More recently, Norshipco was forced to furlough 400 workers or about one half of its workforce.

### Recent Ship Construction Activity

In spite of the slow pace of work, the area still plays a critically important role in constructing the nation’s aircraft carriers and submarines. For example, Northrop Grumman-Newport News Shipbuilding is the only American yard capable of constructing carriers and, therefore, is guaranteed all future carrier contracts. Work is currently underway on the George H. W. Bush, CVN 77. In

addition, the Pentagon decided in late 2002 to finance its next-generation aircraft carrier in 2007. The first CVNX-class carrier, now known as CVN-21, will feature many new technologies which will reduce its crew size from 3,000 to as few as 2,200. The new ship will include such advances as an electromagnetic catapult, a more efficient nuclear reactor, and a hull that makes the ship less recognizable to enemy radar. The carrier is being designed at the Virginia Advanced Shipbuilding and Carrier Integration Center or VASCIC in Newport News. The construction of the new carrier is important to the shipyard's continued health since 6,000 workers are employed to build an aircraft carrier. Construction of the first of the new CVN 21 carriers, CVN 78, is to begin in 2007 and is scheduled for delivery in 2014.[9] In anticipation of further carrier work, a new pier is being constructed to accommodate the Nimitz-class and CVN 21 carriers.

Work also continues on submarines. Currently, Northrop Grumman-Newport News Shipbuilding and Electric Boat, in Groton, CT are cooperatively building Virginia class submarines. Each yard is building a different section of the submarine with each doing final assembly work and then delivering vessels to the Navy on an alternating basis. The first nine submarines are to be constructed using this team-building effort. The Navy hopes to buy a total of thirty Virginia-class submarines. The first two subs to be completed by Northrop Grumman-Newport News Shipbuilding are scheduled for delivery in 2005 and 2007.

Selected Cluster Statistics

Shipbuilding has long been a mainstay of the regional economy but its contribution to the economy has been in decline since the beginning of the defense builddown in the late 1980s.

The ship and boat building industry is much smaller, on the national level, than the automobile industry since it employed only 139 thousand in 2001. By contrast, the shipbuilding industry is several times larger than the auto industry in Hampton Roads. Employment in the area's private shipyards is slightly over twenty thousand civilian workers according to County Business Patterns. Unfortunately, this estimate fails to include the several thousand federal civilian employees doing ship repair work at the Norfolk Naval Shipyard in Portsmouth. Output in the industry is estimated by Regional Economic Models, Inc. to have been $5.2 billion in 2002 (1996 dollars).

Growth in the industry in Hampton Roads has been modest in recent years. From 1970 to 2000, output grew at 3.6 percent annually. This compares to 3.7 percent for the regional economy overall. All of this growth was achieved through increases in productivity since the industry lost over eight hundred jobs annually, on average, during the 1990s due to reductions in DoD spending. The

[9] Although not yet approved, *Inside the Navy* has reported that the Navy plans to delay the start of construction by one year making the start date 2008.

region's modest increase in output from 1970 to 2000 exceeded the increase in output in other locations so that the industry raised its location quotient in Hampton Roads from 7.1 in 1970 to 23.3 in 2000. In other words, while the industry grew slowly in Hampton Roads (compared to overall regional growth), it grew even slower elsewhere (compared to overall U.S. growth). Ship and boating building is the only cluster discussed in this report, which has lost jobs in recent years.

The industry's difficulties in the decade of the 1990s were driven largely by cuts in defense expenditures. However, defense spending began to increase in constant dollar terms in 1998 and the increase since then has been substantial.[10] Little of that increase so far has been spent on shipbuilding since U.S. shipyards are continuing to build ships at below the replacement rate. This has caused some to speculate that the industry will soon benefit from an increase in DoD spending as the nation attempts to rebuild and modernize its naval fleet. However, any increase in DoD shipbuilding activity is likely to be modest at best given the size of the nation's budget deficit, the high and continuing cost of the war in Iraq, the nation's need to add to its expenditures on homeland security and any efforts by the current Administration to privatize social security. REMI projects a modest increase in local shipbuilding output of 1.1 percent annually in real dollar terms from 2002 to 2012. This compares to 3.7 percent for the Hampton Roads economy overall. In other words, the ship and boat building cluster is expected to grow more slowly than the region's economy.

Further growth in the industry has the potential to significantly impact upon the regional economy. For example, if it is assumed that regional efforts are successful in increasing the size of the cluster by fifteen percent by 2012, then the cumulative impact on Hampton Roads from 2004 to 2012 (including secondary impacts resulting from the multiplier process) will be follows: 1,438 new jobs, $35.5 change in regional annual per capita income, $39.7 change in the average annual regional wage, and a $1,777,463 collective net fiscal impact on all of the local governments in Hampton Roads.

## Electrical Equipment Manufacturing

### Background

The electrical equipment manufacturing industry is one of the nation's largest and most dynamic. Products from the industry include many of the staples of modern life including such things as computers, television sets, and audio equipment. In addition, electronics manufacturing is a "cornerstone" industry for the nation's industrial base since the products and components made by electronics firms become inputs used by other industries. Since the industry produces components that become intermediate inputs used in the production

[10] The nation's defense outlays increased by 4.3 percent annually from 1998 to 2004 (estimated). This compares to a decrease of 3.8 percent annually from 1990 to 1998.

processes of other industries, firms in the industry tend to cluster in locations where other industrial firms are located. This explains the relatively small number of electrical equipment manufacturing firms in Hampton Roads since the region is under represented in manufacturing.

Locational changes are occurring in the industry. Electrical equipment manufacturing is heavily concentrated in Silicon Valley, Texas, Massachusetts, and New York. However, because the products made by the industry have high value to weight/size ratios, they are very transportable making it possible for firms to locate in a growing number of metropolitan areas. As a result, while the industry has tended to cluster in some locations, plants can still be found in a wide variety of other areas around the country (U.S. Dept. of Labor, 2002). In fact, there is increasing evidence that new plants are being constructed in non-traditional locations in order to take advantage of a lower cost of living, good schools and universities, an abundant supply of well-trained labor, and a high quality of life. Locating in a community where the quality of life is good makes it easier for the industry to attract and retain the technical workers it needs (Plants Sites & Parks, 1997).

The electrical equipment industry differs from other manufacturing industries in that production workers account for a smaller proportion of jobs than is common for most other industries. Also, because of the rapid pace of innovation and technological change in the industry, it employs a higher than average number of engineering and technical workers. As a result, wages tend to be high.

Another distinguishing characteristic of electrical equipment manufacturing is that the industry has an unusually large number of small firms. The small size of firms is, in part, explained by the high rate of new startups as well as the fact that firms of small size achieve economies of scale in many segments of the industry.

Because of the increasingly important role of electronics in the development of the nation's technology base, the electronics industry is one of America's largest and fastest growing of its many manufacturing sectors. In 2001, the industry employed 575 thousand workers nationally and paid $20.9 billion in payroll. Because of its rapid growth, the industry increased its share of gross domestic product from 6.2 percent in 1990 to 22.5 percent in 2001. In fact, the industry's gross domestic product grew by 13.0 percent annually from 1990 to 2001 as compared to an average annual increase from all manufacturing of 2.3 percent. Clearly, electrical equipment manufacturing is one of the best success stories in the nation's manufacturing sector.

In addition to a strong pattern of growth nationally, the electronics industry has also grown and prospered in Virginia over the years. For example, the industry's employment in Virginia expanded by 12.7 percent from 1995 to 2000

which compares to 6.2 percent for the industry nationally suggesting that the region is competitive in electrical equipment manufacturing. Over the same interval of time, the number of firms in the industry increased at an average annual rate of 3.1 percent. As of 2000, there were 343 electronics firms in Virginia with 54 of those in Hampton Roads. This placed Hampton Roads second among all of the regions of the state behind Northern Virginia, which had 113 (Chmura, 2001).

### Selected Cluster Statistics

Hampton Roads has seen considerable growth in the electrical equipment manufacturing over the years. In 2001, the sector was slightly smaller than the motor vehicle industry employing just over two thousand workers. However, while the industry is still small in Hampton Roads, growth has been rapid causing the industry's location quotient to increase from 0.03 in 1970 to 0.23 in 2000. Furthermore, output in the industry expanded by 13.8 percent annually from 1970 to 2000 which significantly exceeded the average rate of growth in output in the region overall. In addition, the industry grew faster locally than it did nationally since output grew by 13.8 percent annually in Hampton Roads as compared to 7.2 percent nationally.

This pattern of rapid growth is expected to continue. For example, the Bureau of Labor Statistics projects that the industry's employment will expand by 7.4 percent annually from 2002 to 2012 as compared to the U.S. which is expected to expand by just 1.5 percent annually overall. Growth in output is expected to mirror the growth pattern for employment. More specifically, REMI projects that constant dollar output in the industry will expand by 6.2 percent locally from 2002 to 2012 as compared to 3.7 percent for the overall economy.

Further growth in the cluster has the potential to significantly impact upon the regional economy. For example, if it is assumed that regional efforts are successful in increasing the size of the cluster by fifteen percent by 2012, then the cumulative impact on Hampton Roads of regional efforts to promote this cluster over the 2004 to 2012 period (including secondary impacts resulting from the multiplier process) will be as follows: 1,658 new jobs, $67.0 change in annual regional per capita income, $20.3 change in the average annual regional wage, and a $3,183,259 collective net fiscal impact on all of the local governments in Hampton Roads.

## Tourism

### Background

Tourism in the U.S. is a multi-billion dollar industry. In fact, spending by American citizens on domestic travel was more than $490 billion in 2000. Foreign travelers spent another $103 billion in the same year.

Large numbers of travelers visit Virginia each year making tourism one of several important economic engines in the state. In 2002, for example, tourists spent $14 billion in the state, making Virginia tenth among all states in total traveler spending. Furthermore, tourism constituted 4.9 percent of Virginia's gross state product and employed 264,000 workers who received wages of $6.3 billion in 2002 (Global Insight, 2003). Many of the state's tourist assets are located in Hampton Roads, which caused the region to receive 18.7 percent of the state's travel spending in 2000. This placed the region second to Northern Virginia, which captured 46.6 percent of the state's total (Virginia Tourism Corporation, 2003).

The tourism industry in Virginia experienced significant growth in the 1990s. Total travel expenditures in Virginia in 2001 were $12.9 billion, an increase of 5.5 percent annually since 1993. Furthermore, Virginia employment in tourism increased from 158,011 in 1993 to 210,165 in 2001, an increase of 4.1 percent annually. State tax revenue generated by tourism was $651 million in 2001.

In Hampton Roads, the tourism industry has been regarded as one of the mainstays of the regional economy since industry employment was 42 thousand in 2001. The industry paid wages of over six hundred eighty million dollars in 2001.

Tourism also provides a source of substantial tax revenue for area jurisdictions. In 2001, local tax revenue generated by travel expenditures totaled $85.3 million in Hampton Roads. These tax revenues have helped to finance the construction of local schools, libraries, roads, parks, and other public facilities. Travel expenditures in area communities in 2001 were as follows: Virginia Beach, $708.8 million; Norfolk, $446.0 million; Williamsburg, $368.0 million; James City Co., $249.3 million; Newport News, $164.5 million; Chesapeake, $153.1 million; Hampton, $136.3 million; York Co., $105.9 million; Portsmouth, $49.9 million; Suffolk, $31.5 million; Gloucester Co., $27.4 million; Isle of Wight Co., $19.5 million; Franklin, $8.8 million; Southampton Co., $8.7 million; Surry Co., $7.3 million; and Poquoson, $2.4 million.

### The Cruise Business

A cruise business has recently emerged in the City of Norfolk and has begun to produce significant economic benefits for the regional economy.[11]

[11] Norfolk is not alone in its recent emergence in the cruise business. Little over a decade ago, only a few ports handled cruise ships with the most important being in Southeast Florida. Now, a majority of the nation's ports have or are close to having some cruise ship activity. Particularly noteworthy have been the ports in Galveston, Baltimore, New Orleans, Charleston and Philadelphia.

The events of 9/11 spurred the repositioning of cruise ships which were once home ported in New York to other locations on the eastern seaboard. Driving this demand for cruising out of ports near home was the fear of flying that increased dramatically following the events of 9/11. Many persons who formerly were willing to fly to distant destinations in order to begin their cruise now prefer to drive to their port of departure. Not only did 9/11 alter the places from which passengers prefer to cruise, but it also changed the areas to which they travel. In general, Americans have substituted nearby safe locations like other U.S. ports for more remote locations further increasing the demand for travel by ship to domestic ports of call like Hampton Roads.

A further aid to the local industry has been that cruise ships regularly are repaired in area shipyards so that cruise operators are well aware of the attractions in the region making the "education" process much easier when selling the area as a port of call.

The region's cruise business is operated out of Norfolk where ships currently dock at a pier behind Nauticus. The volume of that business has grown rapidly over the last several years. In 2004, for example, some 113 thousand passengers are expected to move through Norfolk, double the number of passengers last year. In addition, nine cruise lines are expected to make more than 60 calls this year. Two of those lines, Holland America and Celebrity Cruises, are making Norfolk a homeport meaning that cruises will begin and end there. Norfolk is currently constructing a $41 million cruise terminal near Nauticus that will open in late 2006.

While economic impact numbers are not available for the local cruise industry, estimates are available for all of North America. According to the International Council of Cruise Lines, the cruise industry produced a twenty billion dollar benefit for the U.S. economy in 2001 with eleven billion of that coming from the spending of the cruise lines and their passengers on U.S. goods and services. Furthermore, the industry produced employment for nearly 268 thousand workers and wages totaling nearly ten billion dollars.

Most states were impacted in some way by the industry. The Council estimated that the industry produced 129 million dollars of direct spending by cruise ships and passengers, 2,277 jobs, and ninety-four million dollars in wages in Virginia.

The Convention Business

Hampton Roads has had a successful convention business for many years. The region has an abundance of both publicly owned convention centers as well as an assortment of convention hotels that also offer meeting space. As with the cruise business, the events of 9/11 have generally helped "drive to"

convention destinations like Hampton Roads since many convention goers prefer to avoid the perceived risk of air travel.

The region's convention business will soon get a boost from two new convention centers now being constructed, which will add to the region's supply of space from which convention planners can select. The larger of those two facilities is the new Virginia Beach Convention Center located in Virginia Beach. This facility is being constructed at a cost of $193.5 million and will be almost three times as large as the Pavilion at just over a half million square feet. The building will contain four exhibit halls which can be operated separately or together to give conventioneers 142,200 square feet of space. There will also be a 31,029-square-foot ballroom with a LED lighting system. The project's first phase is scheduled to open in mid-2005. The second phase is expected to open in 2007.

A second facility is expected to open in 2005. This new facility, the Hampton Roads Convention Center in Hampton, is estimated to cost $90 million. The building will contain 344,000 square feet and offer 30 meeting rooms, a 108,000-square-foot exhibit hall, and a 28,000-square-foot ballroom. A new Embassy Suites hotel along with 245,000 square feet of retail space is also being constructed at the site.

Both new convention centers are currently being leased and bookings are reported to be running on schedule. Together, the facilities will add significantly to the region's ability to attract conventions and meetings.[12]

The Golf Business

Area tourism leaders have looked with great interest, even envy, at the large number of golfers, many from Hampton Roads, who travel to Myrtle Beach to play golf and recreate. Golfers are drawn to that region by its 120 courses packed into a limited area of just 1,134 square miles. This is an area roughly the size of Virginia Beach and Chesapeake combined which, by comparison, has just 20 courses, approximately sixteen percent of the number of courses found in Myrtle Beach (Hull, 2003).

The market represented by traveling golfers is substantial. The National Golf Foundation estimated that in 2002, some eleven million golfers or forty-two percent of the total traveled in order to play golf. Collectively, they spent $19.5 billion dollars on these trips. Virginia ranked ninth among the states as a destination for golf travel. In Virginia Beach, travelers to the city played more than 8,500 rounds of golf in 2003 (Hull, 2003).

[12] The City of Newport News may soon invest $26 million to construct a convention center along with an additional $15 million for a parking garage in City Center at Oyster Point. As currently planned, the center would open in 2006 and seat up to 1,200 people in its main ballroom.

Further additions to the region's mix of public and private golf courses seems likely given the rapid growth in the area's retiree population – many of whom play golf. The region has already seen the addition of a significant number of new courses that have been built in communities, which have been designed to appeal to the area's population and migrating retirees seeking to relocate to upscale residential communities.

Selected Cluster Statistics

Assessing the size and role of tourism in the regional economy has always been difficult since data on the cluster is limited. The primary reason for this lack of data is that tourism is not designated as an "industry" in standard economic accounts. Instead, it is part of several different industries – each of which supplies goods or services to visiting travelers. In the case of Hampton Roads, these travelers normally visit the area on pleasure/sightseeing/business trips. The businesses frequented by these visitors include, but are not limited, to hotels/motels/campgrounds, eating and drinking establishments, amusement and recreational facilities, and retail stores.

The travel cluster is the largest of the clusters selected for consideration in this report. According to statistics published by the Virginia Tourism Corporation, the local cluster employs 42 thousand workers in Hampton Roads. These employees typically work in a great many small businesses located primarily in Hampton, James City County, Newport News, Norfolk, Virginia Beach, Williamsburg, and York County, although all of the communities of Hampton Roads have tourist/convention destinations of some note.

The cluster has expanded over the years in response to the economic growth that has occurred in the markets, which send travelers to Hampton Roads. However, growth in output appears to have been less than for the regional economy overall since hotel output (the best proxy available for the entire cluster) grew by 2.6 percent from 1970 to 2000. This compares to 3.7 percent for the regional economy overall. By contrast, the Bureau of Labor Statistics projects an acceleration in cluster growth from 2002 to 2012 since hotel output is expected to expand by 4.1 percent annually as compared to the historical growth rate of 2.6 percent.

Assuming that regional efforts can increase the size of the cluster by fifteen percent by 2012, then the cumulative impact on Hampton Roads from 2004 to 2012 (including secondary impacts resulting from the multiplier process) will be as follows: 1,629 new jobs, $16.2 change in annual regional per capita income, -$7.7 change in the average annual regional wage, and a $1,910,793 collective net fiscal impact on all of the local governments in Hampton Roads.

Tourism is one of only two clusters that would produce a decline in the average regional wage.[13] This decline would be caused by the relatively low wages paid to workers in the cluster. However, that decline would be small since the average regional wage would decline by less than one dollar for the average worker in the region for an entire year.

## Port/Trucking and Warehousing

### Background

Hampton Roads has been a center for the movement of goods and people for several hundred years. In fact, port facilities were first developed in Hampton Roads during the middle of the 17th century. Growth over the years eventually resulted in the creation of the Virginia State Ports Authority in 1952. The Authority was given broad powers to promote commerce, including the ability to acquire real property for the creation of port facilities. After years of further growth at the port and some competition between terminals, the State created Virginia International Terminals, Inc. in 1982, which assumed control over all of the state-owned terminals in Hampton Roads. This consolidation of port operations, which was controversial at the time, resulted in a dramatic acceleration in the growth of trade passing through the port. For example, before unification, general cargo tonnage declined by 0.2 percent annually from 1973 to 1981. In marked contrast to the pre-unification period, the amount of general cargo increased from 2.7 million tons in 1983 to 14.2 million tons in 2003 for an increase of 8.7 percent annually (Mansfield).

Today, in large part because of its deep, ice-free harbor, central location, modern equipment for handling large vessels and a soft bottom for easy dredging, the Port of Virginia has become one of the leading ports in the nation.[14] Port ranking statistics are impressive. According to the American Association of Port Authorities, the Port of Virginia ranked 20th in 2002 among the nation's ports in terms of cargo volume (measured in short tons). Because the Virginia ports have historically exported more than they have imported, the Port of Virginia ranked 4th in foreign exports. In recent years, moving cargo by container has become an increasingly important way to move goods. In 2003, the region's ports ranked 7th in the number of containers passing through the harbor behind Los Angeles, Long Beach, New York-New Jersey, Oakland, Tacoma, and Charleston. On the East Coast, the port ranked third in the number of containers moved, exceeded only by NewYork/New Jersey and Charleston, SC.[15]

[13] The other cluster is Senior Industries that will to be described below.

[14] The harbor currently has a depth of fifty feet. Virginia Port Authority officials hope to eventually deepen the harbor to fifty-five feet.

[15] Virginia can be expected to rise in these rankings as soon as the new APM Terminal opens in Portsmouth. When the terminal opens in 2007, its added capacity may be enough to increase the port's ranking to 31st among the ports of the world.

Growth in activity at the port has enabled it to become a hub of regional economic activity generating many jobs. According to a study conducted by Martin Associates and commissioned by the Virginia Port Authority, the Port of Hampton Roads directly and indirectly generated 164,258 jobs in Virginia in 1998. These jobs accounted for $583.5 million in wages. Furthermore, in the same year, port activity in Virginia generated $30.3 million in local taxes and $30.4 million in state taxes. By contrast, and somewhat surprisingly, while the majority of the state's port facilities are located in Hampton Roads, there were just 8,525 jobs directly generated (excluding the multiplier effect) by port activity according to the Martin report. On average these jobs paid $32,632 per year, over $2,600 more than the Hampton Roads average.

Recent Growth

Recently the growth in demand for port services has been driven by the 2002 lockout of workers at 29 West Coast ports. The lockout occurred when labor negotiations broke down over benefits covered by a union contract. Labor problems caused shippers to divert vessels destined for the West Coast to East Coast harbors including Hampton Roads. As a result of this contract dispute, some 500 additional containers per month came to Hampton Roads.

Now that the West Coast labor dispute has been resolved, some of the business diverted from the West Coast has been lost. However, the majority or about eighty percent has remained since many shippers have discovered that it is to their advantage to avoid the crowded ports of the West Coast and the expense of shipping their cargoes to the East by rail. Instead, many shipping firms now prefer to sail directly from Asia to East Coast via the Panama Canal rather than loading their cargoes onto trucks and trains on the West Coast for a transcontinental trip to eastern cities.

Another source of recent growth has been the recovery of the global economy accompanied by the rise of shipping into and out of the rapidly growing economies of China and India.

Container Competition

The port handles both general and bulk cargo. General cargo refers to commodities handled in individual units. It can be subdivided into break-bulk cargo and container cargo. Break-bulk is general cargo that is not packed in containers and includes commodities such as rubber, cocoa, automobiles, and heavy machinery. By contrast, commodities that arrive at the terminal in individual units packaged in containers are classified as container cargo. Container cargo is the method by which most cargo moves today.[16]

[16]General cargo terminals, for the most part, are owned by the Commonwealth of Virginia and are leased to nonprofit operators. By contrast, bulk cargo terminals are privately owned and operated.

The ports of New York/New Jersey, Hampton Roads, Baltimore, and Charleston have dominated container handling on the East Coast. Of these, particularly sharp competition has existed between Baltimore and Hampton Roads for containers going to and coming from the Midwest or the Mid-Atlantic regions of the country. In 1983, Baltimore handled nearly twice as many containers as Hampton Roads. Since then, Hampton Roads has steadily increased its share of East Coast container cargo. In fact, by 1995, Hampton Roads handled twice as many containers as Baltimore.

Hampton Roads was able to surpass Baltimore in container tonnage for several reasons. First, Baltimore's port is 12 hours farther from Atlantic shipping lines than is Hampton Roads. This greater distance increased the cost for shippers using Baltimore and made the city's facilities less competitive. Second, the Port of Hampton Roads has excellent rail connections to the Midwest and Mid-Atlantic markets. Finally, labor in Hampton Roads has been both cooperative and productive, especially when compared to Baltimore. For example, in 1996, it was reported that crews in Hampton Roads required 2.4 million man-hours to handle over 9 million tons of cargo. By contrast, Baltimore crews took 2.3 million man-hours to handle 5 million tons.

Because of its many advantages, Hampton Roads has consistently gained market share against other ports on the East Coast. Since 1950, the Port of Virginia has increased its market share of exports by 0.5 percentage points annually as compared to 0.3 percentage points for imports. In general, the southern ports have gained market share at the expense of northern ports.

Coal

Coal is one of several commodities exported from the port. On the south side, those shipments are made through the Lamberts Point terminal that is served by Norfolk Southern. On the Peninsula, coal is exported through Dominion Terminal Associates and Pier IX Terminal, both of which are served by Norfolk Southern and CSX Transportation.

The region's coal business has been highly cyclical over the years due to rapid changes in international supply and demand conditions. In recent years, for example, the volume of exports has declined significantly because of strength in the dollar, low ocean freight rates which have made many foreign sources of coal more affordable, and the availability of cheaper coal from Australia, South Africa, and China. As a result of these unfavorable conditions, the shipment of coal through the port, which peaked at 65 million tons in 1991, slipped to approximately 20 million tons recently. Employment at coal terminals has declined along with the decrease in the demand for coal.

At present, the demand for coal appears to be improving in large part because of growth in China's economy[17]. Not only has this growth driven up the worldwide demand for coal but it has also led to an increase in ocean freight rates which have lowered the delivered price of U.S. coal in foreign markets and has made American coal more competitive. Additionally, the American dollar has declined relative to the Australian dollar – again making American coal more attractive. All of these conditions are helping to make the coal shipped from Hampton Roads more attractive in world markets so that exports may rise from current levels. However, international events can and have changed quickly in the past making it difficult to determine whether or not the favorable conditions now in place are likely to persist.

Port Expansion

Port expansion and modernization is an ongoing process at the Port of Virginia. Examples of recent activity have been the purchase of new cranes for the Norfolk and Portsmouth marine terminals and the dredging of the harbor channels to a depth of fifty feet. The Norfolk International Terminals South is also undergoing a $279 million expansion.

These investments will benefit the port substantially – especially if improvements are made to the Panama Canal. Since the largest ships used in international commerce can no longer fit through the Canal, Panama is now examining the option of widening their existing facility. Fortunately, if the decision is made to go forward with that project, the Port of Virginia has already made the investments that would be required to accommodate the largest ships afloat since it has a fifty feet channel and cranes currently able to handle the largest container ships.[18] [19]

Widening of the Panama Canal is critical to the continuing success of the Port of Hampton Roads. Many of the ships being constructed today as well as others now in operation are too large to use the Canal. If the Canal is not widened, many of them will not be able to reach Hampton Roads from Asia by passing through the Canal.[20] This will place Hampton Roads at a competitive disadvantage when compared to facilities on the West Coast. Until recently, discussions in Panama centered on widening the canal so as to permit the passage of 12,500-TEU ships. However, in order to reduce the cost of the project and make it more acceptable to Panamians, that plan has been scaled back. The new plan would allow the passage of ships carrying up to 10,500 TEUs or double the size of the ships able to use the Canal today. Whether or not the Canal is widened depends upon a vote of the Panamanian people.

[17] China has had the world's fastest growing economy since 1980 (Miller, 2004)
[18] The Ports's new Suez-class container cranes are the largest and fastest in the world.
[19] At fifty feet, the Port's channels are deeper than those of any other East Coast harbor.
[20] One estimated made for Inside Business (August 23, 2003) is that by 2007 some 250 more ships will be sailing which will be too big to pass through the Panama Canal. Of these, 170 will be larger than the biggest ships in use today.

Also of critical importance to the port's future is that new container capacity will soon be added by the A. P. Moller Group. This Danish conglomerate announced that it would build a $450 million cargo terminal in Portsmouth on a 575-acre site located on the Elizabeth River to replace its 71-acre facility near the Portsmouth Marine Terminal.[21] This expansion is expected to increase the port's capacity by fifty percent. When complete, the new terminal will have three berths, 12 cranes, several hundred acres of container storage and a rail terminal served by both Norfolk Southern Railway and CSX Transportation.[22] This increase in capacity is badly needed because the Virginia Port Authority's state-run terminals are operating at or near capacity. The new terminal is expected to begin operations in 2007. The importance of this project to the regional port is clear since without it the port would reach its maximum capacity in five to eight years and would be forced to begin turning new business. The investment being made by Maersk elevates the area's stature in the world of global commerce and may produce other investments/commitments to the region's port.

The addition of the new terminal will more than likely move the Hampton Roads port into second place among the East Coast ports in terms of container volume. Currently, New York with its massive consumer market is the leading port for containers on the eastern seaboard. Charleston is a distant second and is only slightly ahead of Hampton Roads, which is in third place. Savannah is fourth among the major ports but is closing rapidly on Charleston and Hampton Roads. Baltimore, which competed with Hampton Roads fifteen years ago, now handles only a third as much traffic as Hampton Roads. Because of the region's greater capacity, the opening of the new terminal will almost certainly move Hampton Roads into second position ahead of Charleston, which is rapidly running out of space for additional port-related growth.

Longer term, the opening of Craney Island in 2017 will further increase the capacity of the region's port and help to insure continued growth of the Port of Virginia. VPA's fourth terminal is projected to be constructed near the new APM Terminal atop an eastward expansion of the Craney Island dredge-disposal site. Craney Island will boost port capacity so that the Port of Hampton Roads will be able to handle the projected growth in cargo through the year 2035. The project is expected to be constructed in four stages from 2007 to 2032. Development of the project seems likely, in spite of environmental concerns voiced by the Virginia Port Authority since the nation will shortly need additional port space and other ports are nearing capacity. The Craney Island facility will soon represent one of the nation's best opportunities to add port capacity since it is the only large piece

[21] A. P. Moller Group owns both APM Terminals Inc. and the Maersk Sealand shipping company. APM supplies terminal services to Maersk Sealand.

[22] Maersk operates a group of container terminal hubs around the world. These hubs are designed to handle the company's Post Panamax ships which are too wide to fit through the Panama Canal. The company currently operates hubs in Spain, Malaysia, Holland, China, and Los Angeles. The new terminal in Hampton Roads will join this short list of ports in its network of service areas.

of undeveloped land on deep water with both rail and road access that remains on the East Coast.[23]

The long-term health of the port rests, in part, upon the development of a third crossing between the Peninsula and South Hampton Roads and a related connector road from Interstate 564. Additionally, improvements to route 460 must be made to give South Hampton Roads and its port facilities better access to the outside world. The financing of these facilities was brought to a referendum and rejected by Hampton Roads voters in the November 2002 election. The port's ability to grow is threatened if congestion in the region worsens significantly. However, if current trends continue and if additional capacity is added to the area's transportation network as well as its port facilities, Hampton Roads will likely emerge as a hub port. As a hub, the world's largest ships will call at the harbor where they will offload their cargoes onto smaller ships which will carry those cargoes to other East Coast cities including Baltimore and New York. The long-term future for the port appears bright but the region must be vigilant to make sure that investments are made to accommodate the increase in demand for shipping that will surely grow along with the expansion of international trade.

Port Security

Since September 11, 2001, security has become an issue for the nation's ports. Fortunately for Hampton Roads, the Port of Virginia is one of the most secure, if not the most secure, port in the U.S. since, among other things, every container entering the harbor is scanned for radiation leaks. Approximately twelve times per month these scans detect radiation emissions, which require that a further inspection be done. The Port of Virginia is the only port in the nation that is equipped with radiation detectors (Newswanger, 2004).[24]

Port security in Hampton Roads is especially "tight" because of the port's special role in helping the nation deal with overseas emergencies. In fact, during times of international conflict, Hampton Roads is one of 14 strategic ports in the U.S. from which equipment, personnel, and supplies are to be shipped to overseas locations (Newswanger, 2004).

Distribution Centers

The distribution function has become increasing important to the nation's economy – especially given the growing interconnectedness of domestic and global commerce. As a result of having particularly favorable locations, New

[23]Some idea of the need to further expand the area's port came from a 2002 report done for the U.S. Chamber of Commerce by the TranSystems Corporation predicting that U.S. ports will be pushed to their limits over the next twenty years. The study estimated that by 2020 the total tonnage of freight carried into and out of U.S. ports will grow by 67 percent.

[24] Not only are containers scanned when they enter the harbor but they are also scanned when they leave the port by truck or train.

York, Atlanta, Chicago, Dallas, Denver, and Los Angeles have become distribution centers of great importance. These cities have emerged as centers for distribution since they have good highway and rail connections, access to major port facilities, large consuming and producing markets, and good overnight delivery capabilities (Moline, 2001).[25]

Hampton Roads is one of a select number of metropolitan areas, which have emerged as a distribution center in the Southeast. While much of the cargo passing through the region's harbor goes directly from one mode of transportation to another, other shipments make a stop in Hampton Roads where they are stored temporarily before making the next leg of their journey. When in the region, these shipments are housed in warehouses of various types where processing, labeling, freezing or repackaging of the cargo takes place.[26] Adding value to merchandise while it is stored has become an important component of distribution in recent years. This process occurs for cargoes being shipped to both domestic and foreign destinations. Area warehouses store general merchandise as well as goods needing refrigeration. Because there is a growing need to perform these operations in Hampton Roads, many warehouses have been constructed in the region in recent years and more can be expected given the low vacancy rates in area facilities and the rapid growth in container shipping. Aside from the presence of the port, the region's primary attraction to distribution operations is that an abundance of land is available near port facilities and access to Interstate 95 is good.

Examples of large distribution centers that have opened in recent years include the Wal-Mart facility in James City County, the Target operation in Suffolk, and the Cost Plus facility in Isle of Wight County. The region is currently home to 35 large-scale distribution centers. More are on the way.[27]

At present the region competes with Savannah and Charleston for the nation's East Coast distribution business. Unlike goods passing through New York and New Jersey, which are destined for that area's consumer market, Savannah, Charleston, and Hampton Roads provide access to much larger geographic areas.

[25] In many parts of the nation, truck drivers are in short supply due to the demands which their work places on them. Because of the shortness of supply, companies do their best to provide drivers with trips of no more than 400 miles.

[26] Some shipments are in the region for only a short time since "cross docking" is becoming an increasingly common practice. Cross docking is the movement of goods from one truck to another, literally across the dock, without entering the warehouse for storage or processing.

[27] The role of the wholesaler has diminished in recent years. Traditionally, the wholesaler collected materials and merchandise from a variety of individual producers and then distributed them to the next stage of production or to retailers for final sale. Today, with the advent of the mass merchandisers, many retail firms deal directly with producers, by-passing the wholesaler altogether.

### Selected Cluster Statistics

The Port/Trucking and Warehousing cluster plays a large role in the nation's economy. For example, in 2002 the cluster employed 2.7 million workers nationally, up from 2.4 million in 1990, for a growth rate of 1.0 percent annually.

In Hampton Roads, the cluster employed nearly twenty-one thousand workers in 2001. Cluster output grew by 3.3 percent annually over the 1970 to 2000 period as compared to the 3.7 percent for the regional economy overall. While water transportation employment has grown slowly over the years due to increases in productivity and is not projected to expand significantly in future years, the trucking and warehousing component of the cluster is projected to add jobs at the rate of 2.4 percent annually from 2002 to 2012.

Further growth in the cluster has the potential to significantly impact upon the regional economy. For example, if it is assumed that regional efforts are successful in increasing the size of the cluster by fifteen percent by 2012, then the cumulative impact on Hampton Roads from 2004 to 2012 (including secondary impacts resulting from the multiplier process in the economy) will be as follows: 1,308 new jobs, $17.6 change in annual regional per capita income, $7.2 change in the average annual regional wage, and a $1,722,155 collective net fiscal impact on all of the local governments in Hampton Roads.

## Senior Industries

### Background

The American population is aging. In fact, the elderly age cohorts are now among the nation's most rapidly growing. The aging statistics are impressive. During the 20th century, the number of persons in the U.S. under age 65 tripled. By contrast, the number of persons aged 65 and over increased by a factor of eleven – much faster than the increase in the nation's non-elderly population. As a result, the elderly, who made up just one in every twenty-five persons in the nation in 1900, were one out of every eight by 1994. The importance of the elderly in the nation's population has increased further since then.

This societal aging process will continue. By the middle of the 21st century, the Census projects that the elderly will comprise one in five of all Americans as the baby boomers pass through their retirement years. This increase in the number of elderly persons is being driven by the aging of the baby boomers along with the increase in the life span. These two powerful demographic forces are converging to produce a rapidly growing elderly population (Bureau of the Census, 1995).

Virginia is participating in the aging trend as can be seen in some of the latest figures on the elderly population released by the Census. These figures indicate that Virginia ranked 43rd among the states in terms of the percent of its population which is sixty-five years of age or older as of July 1, 2003. This low ranking stems from the fact that in Virginia only 11.3 percent of the population is sixty-five or older as compared to the national average of 12.4 percent. However, Virginia's elderly ranking is likely to change rapidly since the state was eleventh among the states in the percent change in the number of persons who are sixty-five and older from April 1, 2000 to July 1, 2003 and seventh among the states in the absolute change in the number of elderly over the same period. In fact, over the 2000 to 2003 period, Virginia added 41,098 persons sixty-five years of age and older for an increase of 12,646 per year. The increase was larger in only six other states.[28] So while Virginia is a youthful state, it has begun to age rapidly – in large part due to migration.

Many of the states and communities to which these retirees have moved have experienced significant and positive economic impacts from retiree migration. As a result, a growing number of states, especially in the Southeast and Southwest, and some communities as well, have begun to recruit these older migrants, both as tourists and prospective residents. In addition, individual companies, mostly those in the business of developing new residential communities, have also begun their own marketing programs designed to convert distant retirees into customers for their products. The magnitude of this effort to tap into the retirement market has been growing, and it may be time for Hampton Roads to begin recruiting retirees as residents, especially those with substantial financial resources.

Elderly Migration

Each and every day, a large number of people retire and that number will grow with the passage of time. Most retirees will "age in place" by remaining in their current location during their retirement years but a growing number of them will elect to make a long-distance move to a retirement location which will better meet their needs.

While migration rates are lower for the elderly, older people do move and many relocate to places far away from home.[29] In fact, an examination of Census data indicates that 18.8 percent of the nation's elderly population moved to a different state between 1995 and 2000.[30] Another 21.5 percent moved to a

[28] States with larger increases along with and their elderly population increase were California, 169,210; Texas, 102,728; Florida, 89,733; North Carolina, 47,198; Arizona, 46,628; and Georgia, 41,226.

[29] Age is a principal determinant of migration. Migration rates usually peak between ages 18 and 30 and then gradually decline until late in life only to rise again for the very old as failing health causes them to change their living arrangements.

[30] These figures indicate a change of address between the two points in time. They do not indicate the number of moves made.

different county in the same state, also suggesting a move of some distance (Bureau of the Census, 2003).

Many of the nation's migrating elderly have moved to Virginia over the years. For example, over the period from 1995 to 2000, according to Census figures, 38,977 elderly persons migrated to Virginia while 32,040 emigrated to locations out of state. As a result, net migration was a positive 6,937 persons for a migration rate of 8.9 percent.[31] This rate ranked Virginia 13th among the states in terms of the net migration (Bureau of the Census, 2003).[32] Retirees migrating to Virginia were largely from Florida, Maryland, New Jersey, New York, and Pennslyvania (Longino, 1995).

Future Migration

While the number of retirees migrating to Virginia is already high, that migration flow is likely to increase in the future. Published statistics on migration currently reflect the retirement habits of the "Eisenhower Generation" or those persons born between the Depression and World War II. This generation was relatively small in size since few people were born during this very stressful period and a sharp cutback in foreign immigration occurred at the same time as well. The members of this generation currently account for only 14 percent of the national population and are approximately one half as large as the Baby Boom Generation, which was born between 1946 and 1964.[33] As baby boomers begin to retire, this larger age cohort could send many migrating retirees into Virginia (Diane R. Suchman, 2001).

Some notion of the potential for higher levels of future migration can be seen by looking at the number of persons who are turning sixty. During the decade from 1990 to 2000 the elderly population sixty years of age and older increased by 3.5 million persons. By contrast, during the period from 2000 to 2010, the size of the sixty and older age cohort is projected to increase by ten million – almost three times that of the preceding decade. The increase in the size of the nation's elderly population, sometimes referred to as a "demographic or age wave," will increase the number of migrants making long distance moves with many of those migrating retirees moving to Virginia. The increase in the number of elderly retirees will represent for some an opportunity to service this large consuming group (Diane R. Suchman, 2001).

[31] The net migration rate is inmigration minus outmigration divided by the 1995 elderly population. Those results are then multiplied by one hundred.

[32] Migration rates, while high in Virginia, have historically been higher in nearby states in the South Atlantic region. Other states with higher migration rates during the 1995 to 2000 period were as follows: Florida, 56.9 percent; South Carolina, 33.6 percent: North Carolina, 22.1 percent; Georgia, 18.1 percent. The rate for Georgia would almost certainly be higher if the state had a longer seacoast since many migrating retirees have tended to relocate to coastal locations.

[33] The Eisenhower Generation contains 38 million people as compared to the Baby Boom Generation with its population of 76 million.

Another factor that may increase the number of retirees moving to Virginia is that the Baby Boom Generation appears to have somewhat different views about their retirement than did members of the Eisenhower Generation since many boomers expect to relocate during retirement. For example, a recent survey done by Del Webb (a developer of retirement communities now owned by Pulte Homes) showed that fifty-nine percent of baby boomers between the ages of forty-four and fifty-six intend to relocate to a new home in retirement. This represented a surprising increase since the previous survey, done a few years earlier, found that only thirty-one percent planned to relocate in retirement. Of those expressing an intention to relocate, forty-seven percent indicated that they plan to move more than one hour from their current homes with the majority indicating that they will relocate more than three hours away. Of the states listed as the preferred retirement location, Florida was chosen by 21 percent, Arizona by 18 percent, the two Carolinas by 10 percent, Tennessee by 9 percent followed by Colorado, Texas, and Virginia at 7 percent each. The increasing tendency of baby boomers to consider a relocation of some distance along with the large size of that age cohort and the interest which they have expressed in Virginia suggest that migration to the Commonwealth will continue to be large and will likely increase from current levels.

Economic Impact of Elderly Migrants

Affluent, amenity-seeking retirees have the potential to significantly impact upon the communities, regions, and states to which they move. Those impacts are likely to be largely positive and have been repeatedly measured by both consultants and academics.

Among the various impacts examined, perhaps the most important is the impact on incomes. Retiree incomes have the potential to significantly impact upon a community since those incomes are earned elsewhere and are spent locally so that, in a sense, retirees function in a community like a basic activity.[34] These incomes generally provide the community with a steady flow of new spending which is not vulnerable to the business cycle since retiree incomes are made up predominately of government transfer payments and pension benefits along with payments of interest and dividends. Income from these various sources eventually enter into the spending stream of the host community when retirees consume locally provided goods and services. This local spending creates jobs and stimulates local business activity. Retirees themselves take some of these jobs since not all elderly migrants leave the workforce but continue to work on a full or part-time basis long after they have begun to collect retiree pension benefits.

[34] Basic economic activities bring “new” money into a community while non-basic activities simply circulate money in the community that is already there.

Retirees can benefit a community in other ways as well. For example, retirees increase the local tax base by purchasing housing.[35] The resulting increase in taxes usually comes with only modest increases in expenditures by the local unit of government, especially since retirement housing does not bring along with it a significant increase in school attendance and highway congestion. As a result, the net fiscal impact on local governments is typically positive with the local government collecting more in revenue than it spends on the services required by retirees.[36] A further benefit is that retirees do not significantly pollute or damage the local environment in contrast to what may happen as a result of the operations of commercial enterprises. A further benefit is that retirees typically volunteer their time and contribute financially to local philanthropic and service organizations. Finally, retirees bring their investment portfolios with them when moving to a new location that may eventually result in new deposits in local financial institutions (Fagan and Longino, 1993).

While retirees frequently produce positive fiscal impacts on local governments, some have expressed concern that they may not be supportive of local bond issues designed to increase spending for highways and schools because their need for those facilities is distinctly limited. This can be particularly important since the elderly tend to vote in disproportionately large numbers. As a result, their attitudes toward local tax issues can make a difference in close elections. Research has occasionally confirmed these suspicions since retirees have, on some occasions, been found to be unsupportive of tax increases to pay for infrastructure and public services.[37] Finally, they may also not support local economic development initiatives if they perceive that growth may ultimately detract from their quality of life (Reeder, 1998).

Impact Studies

Numerous studies have been done over the years in an effort to quantify the local impact of retirees. One such study was done by Thomas, Warren & Associates in 1998. Their study determined that Arizona's retirement-age population created a $307 million annual benefit for the state. The study also found that only four percent of Arizonans age 55 and older received medical and assisted-living benefits from the state and counties in 1997. This compared to nine percent for Arizonans under age 55. In addition, it was estimated that bank deposits in Sun City and Sun City West, both located in Arizona, totaled $2.4 billion or about $66 thousand per household. Their study further estimated that they state's fifty-five and older population contributed, on average, $1,377 to charities in 1995 as compared to $831 for those under fifty-five. Finally, thirty-

[35] Retirees own housing that is valued twenty percent higher than the national average.
[36] While the elderly typically are heavy users of some types of public services, such as public transportation and health services, they place few demands on big-ticket local government spending items like education. However, some retirees may become improverished by health care costs and may eventually need a variety of services from local and state governments.
[37] It should be noted that retirees in some locations have supported initiatives which would increase their taxes in order to provide for better local schools.

seven percent of the state's population fifty-five and older were estimated to have performed some type of volunteer service in 1997. In total, the state's retirement age population created an estimated 150,000 jobs (Fagan, 2002).[38]

Another statewide study was conducted for Arkansas. Researchers there found that in-migrating retirees created 3,185 jobs and $89.4 million in value added by the state's construction industry in 1998. In addition, the day-to-day spending of in-migrating retirees created another 3,343 jobs and $126.8 million in value added.[39] The fiscal impact was also substantial since each in-migrating retiree household was found to produce a net fiscal benefit to the state of $461 annually (Fagan, 2002).

In addition to investigations at the state level, other studies have been done for local communities. One such study done for the Phoenix area concluded that Sun City produced three hundred million dollars in local spending and created eleven thousand jobs along with thirty-two million dollars in state and county taxes. The residents received one billion dollars in annual income and had eight billion dollars in net worth (Fagan, 2002).[40]

In the same study, Sun City residents were also found to participate in a wide variety of community activities. In fact, they volunteered for some 200 civic and service clubs. They also contributed thirty-two thousand hours to a local community center. Four hundred residents assisted the local sheriff with crime prevention activities while twenty-four hundred volunteered for duties in area hospitals. Finally, retired executives were found to have shared their experience and expertise with local small business owners (Fagan, 2002).

Finally, researchers have expressed some concern over the quality of the jobs generated by in-migrating retirees. One study reported that nearly a third of all jobs created by retirees are in retail stores and eating and drinking establishments where earnings per worker are well below the average of all sectors. Other studies have pointed out that jobs are also created in much higher paying sectors such as health care, real estate and construction (Deller, 1995).

## Recruiting Retirees

Over the years, states and communities have come to recognize the benefits, which they can derive from attracting retirees – especially those who are affluent. These communities hope to benefit from the fact that retirees

[38] Various studies have attempted to develop retiree job multipliers. One Florida study estimated that each 2.5 retirees produced one new job in the state. Another study from Texas A&M produced a similar estimate since it calculated that each new retiree household moving to East Texas generated one new job.

[39] Value added is also referred to as gross product or the net benefit to a community of an economic enterprise.

[40] Date and researcher were not specified.

increase local spending, have spending patterns which do not respond significantly to the business cycle, invest in local thrift institutions, volunteer their time and money to local charitable institutions, produce a net positive impact on state and local governments, use only limited public services, and do not contribute substantially to local crime, pollution, or congestion.

Aware of these benefits along with the recognition that migrating retirees are "fanning out" to a wider variety of retirement destinations than was the case just a few years ago, many states and communities have begun to actively recruit persons fifty-five years of age and older. For example, in 1998, North Carolina, South Carolina, Alabama, Louisiana, Mississippi, Arkansas, New Mexico, Florida, and Pennsylvania were all actively recruiting retirees. In addition, Idaho, Texas, Washington, and Tennessee were considering the development of programs designed to market to seniors (Fagan, 2002).

The methods used to reach seniors have varied considerably. Some states and communities have used direct-mail campaigns, toll-free hotlines, highway billboards, videos, ads in national magazines and representation at travel and recreational vehicle shows. Others, by contrast, have not used well-orchestrated marketing efforts but instead have relied on the promotional activities of the private sector.

Several states have highly structured programs to recruit elderly retirees. Of these, Mississippi's program is one of the better known. Mississippi's efforts center on certifying selected communities as being desirable for retirement living because of their low cost of living, low crime rate, mild four-season climate, quality health care, educational and cultural opportunities and the availability of outdoor recreation. Certification entitles a community to be included in the state's national marketing campaign and to receive training in retiree recruitment. Mississippi's "retirement cities" are marketed to active, amenity-seeking, out-of-state persons aged 50-65. To strengthen its recruitment strategy, the state has instituted an income-tax exemption on qualified retirement income. Finally, it assists the developers of retirement communities on a variety of things including permitting and financing.

Alabama has taken a somewhat different approach. The state has constructed a golf trail designed to attract both tourists and retirees. This trail, named the Robert Trent Jones Trail, includes public golf courses in eight different locations within two hours of one another and within ten minutes of an interstate.[41] The system of golf courses was financed by the Retirement Systems of Alabama and originally included 324 holes of golf making it, at the time, the largest golf course construction project in history. In spite of its large

[41] The trail was named after Robert Trent Jones, Sr. who is among the premier golf course architects of the 20th century. He has designed more than 500 golf courses around the world. Thirty-five are listed among *Golf Digest's* "America's 100 Greatest Golf Courses."

size, the project was completed in just three years. Seventy-two additional holes have been added since then. All are located in Alabama.

State tax policy has also been viewed as a recruitment strategy. Texas, Florida, and Nevada, for example, have not imposed a personal income tax – in part to increase their attractiveness to new retirees. This has caused many retirees to view those states with favor. In addition, more than half of the states have excluded social security income from the calculation of its income tax. Others have exempted public and even private pension income from the calculation of the state income tax. Each of these efforts was designed, at least in part, to make the state more appealing and affordable to current and prospective retirees.

Selected Cluster Statistics

Relocating retirees have come to Hampton Roads for many years. As a result, the area's population has experienced a faster increase in its median age than has the nation overall. Many of these migrating retirees have been attracted to the region's planned communities, which have been developed with retirees in mind. Further, many of those "age targeted" communities have been located on Virginia's Peninsula – especially James City and York Counties and Williamsburg.[42] Examples of some of these communities are the Arbors at Port Warwick, Chambrel at Williamsburg, Ford's Colony, Kingsmill on the James, and Colonial Heritage. Somewhat fewer adult-oriented communities have been located on south side Hampton Roads but the number is growing rapidly, especially in Chesapeake and Virginia Beach.

The development of these and other communities has changed the demographics of some locations on the Peninsula. For example, in 1980, persons sixty-five and older constituted 7.3 percent of the population in James City and York Counties and Williamsburg. By 2000, that proportion had increased to 12.6 percent.

The arrival of these elderly newcomers has transformed their host communities in a variety of ways. Perhaps most important has been the change in area per capita income which, in the case of James City County and Williamsburg, experienced large relative increases in their incomes. In fact, per capita income in James City County and Williamsburg (combined) increased from slightly over eighty-five percent of the national average several decades ago to nearly one hundred and thirty percent of the national average in 2002. While incomes have increased in large measure because of the in-migration of affluent retirees, the average wage has declined – but only slightly. Part of this decline is likely attributable to retail and service sector jobs generated by the area's new

[42] Age-targeted communities discourage non-elderly homebuyers by not being convenient to schools and playgrounds and by offering homes with only two bedrooms.

elderly population. However, the decline may also have resulted from the rapid rate of suburbanization, which has occurred, in those communities.[43]

Further growth in the number of retirees in the region has the potential to significantly impact upon the regional economy. For example, if it is assumed that regional efforts are successful in increasing the size of the cluster by fifteen percent by 2012, then the cumulative impacts on Hampton Roads for 2004 to 2012 (including secondary impacts resulting from the multiplier process) will be as follows: 277 new jobs, $11.2 change in annual regional per capita income, -$0.5 change in the average annual regional wage, and a $780,400 collective net fiscal impact on all of the local governments in Hampton Roads.

## Information Technology

### Background

The information technology (IT) cluster is comprised of two very different components – manufacturing and computer services. IT manufacturing includes the production of such things as computers and communication equipment along with their primary building blocks – semiconductors and other electronic devices. While these products constitute the core of IT manufacturing, some definitions also include the production of measuring and testing equipment such as photonics, electromedical and aeronautical devices, and consumer electronics.

A second and very different component of the cluster is IT services which include those firms, which are engaged in providing IT services and software. More specifically, IT services include computer programming, the delivery of prepackaged software, the design of computer integrated systems, data processing, information retrieval, computer facilities management, and computer repair and rental and developing and maintaining internet and intranet capabilities.

While there are a large number of firms populating the computer services sector, it is important to recognize that additional IT service work is performed within companies, which are not in the information technology sector. Stated differently, there are internal IT operating units within firms whose primary line of work has nothing to do with providing computer services to outside clients. These units are responsible for providing many of the services which are commonly available from outside IT service firms. These “in-house” IT operations perform information functions, which the firm has decided not to

[43] Incomes do not always increase when large numbers of elderly move into a community. For example, an HRPDC sample of thirty counties which have experienced a rapid increase in the proportion of their elderly population revealed that one half increased their per capita income faster than the national average while half did not. However, those communities which contained large new communities which marketed to the affluent elderly did experience a significant increase their incomes.

outsource to other firms. Since, in many cases, these internal IT functions can be physically separated from other functions being performed within a company, communities and regions which may not have other facets of a company's business such as manufacturing, research, or business decision making may instead have the potential to attract and retain those parts of firms which perform IT functions. In other words, regions can specialize in the service side of information technology by playing host to IT firms as well as to the IT operating divisions of firms whose principal line of work has nothing to do with information technology.

Of the two components of IT, Hampton Roads appears to have the best opportunity for future growth on the services side of the cluster given the region's large supply of computer-related occupations.[44]

Many IT functions and firms have located in Virginia in recent years. At present, the state has a heavy concentration of semiconductor chip manufacturers, fiber optics and communications equipment suppliers, and related businesses. In fact, the Virginia Economic Development Partnership estimates that the state has over ten thousand firms in IT employing over one-quarter million workers. Most of these workers are employed in computer companies giving Virginia the distinction of having the largest concentration of such firms of all the states. Furthermore, the state has approximately three thousand companies providing IT, telecommunications, and Internet services. The largest share of these firms is located in Northern Virginia, which has the second-highest regional concentration of high tech (mostly IT and telecommunications firms) in the nation, after Silicon Valley. The presence of so many firms has caused the American Electronics Association to rank Virginia ninth in the nation in high-tech employment.

Hampton Roads appears to be well positioned to continue its growth in both IT firms as well as those firms in other industries, which choose to locate their IT functions in the region. The region's principal advantage is that it has considerable depth in the technical occupations needed by IT firms.

Selected Cluster Statistics

Information technology has been a large and successful cluster in Hampton Roads for many years since the region employed nearly ten thousand persons in the cluster in 2001. Furthermore, the cluster has grown rapidly in Hampton Roads, in large part, because of the presence of the area's military facilities and defense contractors. As a result, information technology has become increasingly concentrated in Hampton Roads where its location quotient

[44] Metropolitan areas almost invariably specialize in either the hardware or service side of IT. For example, Atlanta, Denver, Seattle, and Washington, D.C. have specialized in IT services while Portland has a specialization in IT manufacturing. Far fewer communities like Boston and Dallas have specialized in both IT manufacturing and services.

has increased from 0.39 in 1970 to 0.67 in 2000. Much of this increase in specialization stems from the fact that labor costs, the primary expense faced by the cluster, are just 77 percent of the national average for comparable labor.

One expression of the growth in the cluster has been the increase in the number of computer specialists who live and work in the region. Figure 2 illustrates this point by making a comparison of the increase in the number of computer specialists in the region with several other categories of technology occupations. As can be seen in the chart, the number of computer specialists increased from a few thousand in 1970 to nearly twenty thousand in 2002, far outpacing the growth in several other technical specialties. A further comparison is made in Figure 3, which shows the growth in the number of computer specialists from 1980 to 2002. As can be seen in the chart, the number of such specialists has grown by nearly 450 percent nationally but by over five hundred percent in Hampton Roads.

**Figure 2: High Tech Employment in Hampton Roads**

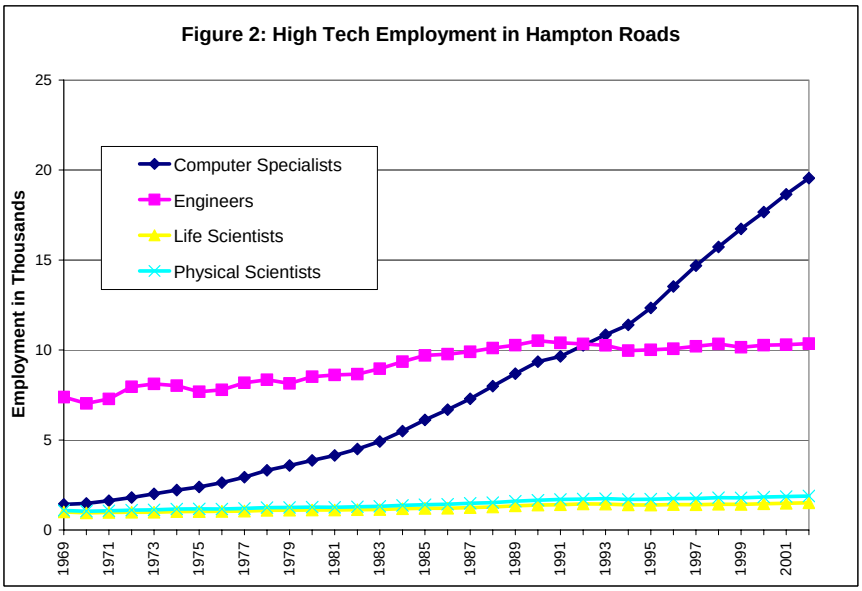
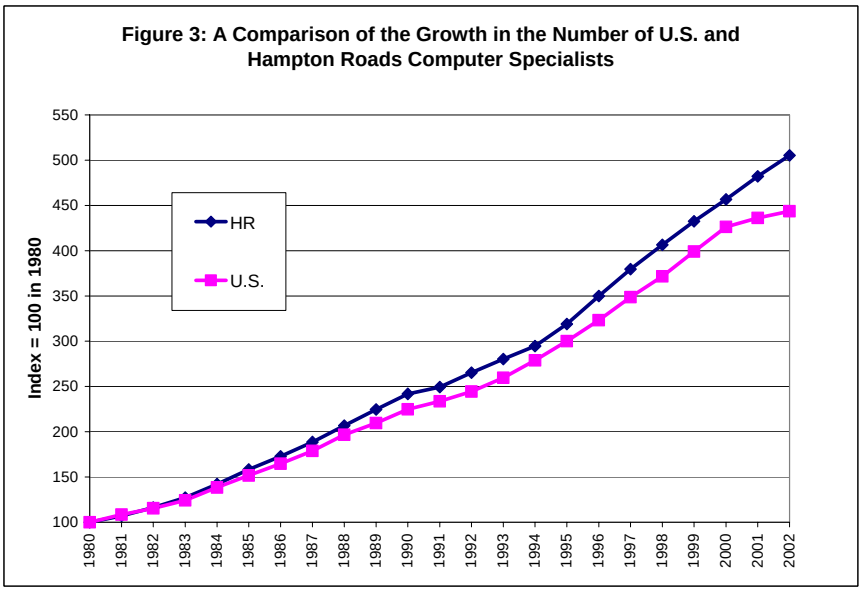
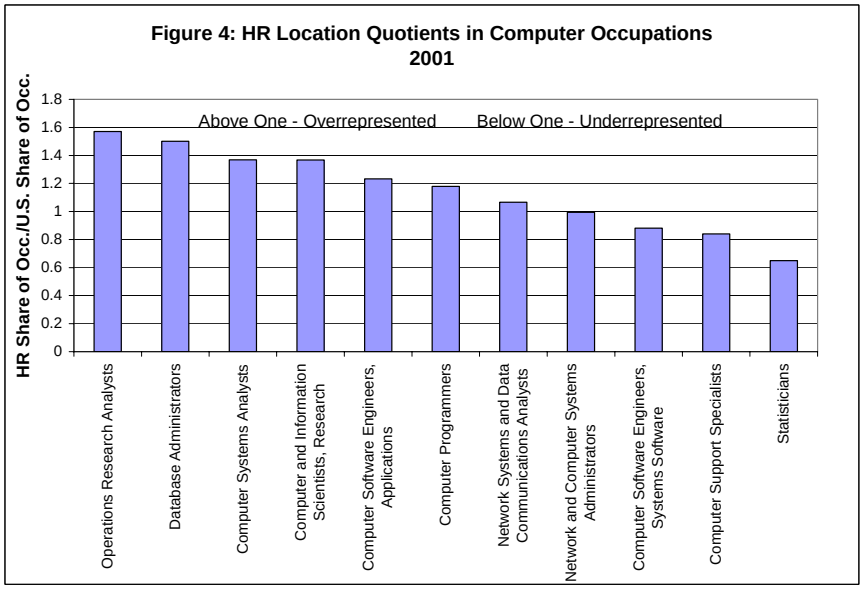



**Figure 3: A Comparison of the Growth in the Number of U.S. and Hampton Roads Computer Specialists**




At present, the region has a large number of civilian workers in information technology professions. In fact in 2001, the region had 3,330 computer systems analysts, 3,210 computer programmers, 2,420 computer software engineers (applications), 2,250 computer support specialists, 1,250 computer software

engineers (systems software), and 1,230 network and computer systems administrators, 850 database administrators, 730 communications analysts, and 190 computer and information research scientists for a total of over fifteen thousand persons working directly in computer-based information technology. This is an unusually large number of specialists within these informational categories since the location quotients for most of these occupations are above one as can be seen in Figure 4. This large number of information specialists serves as a base from which this cluster can continue to grow.[45]




The pool of the region's computer specialists is renewed each year from two sources. Some fifteen thousand persons exit military service in the region each year, many with high-level computer skills adding to the pool of talent from which information technology firms can draw labor. Additionally, the area's colleges and universities graduate a large number of people trained in various computer specialties. In fact, in the 2000-2001 school year, the region had over seventeen hundred students listing computer and information systems as their major. Unfortunately, many of these students leave the area when they graduate. However, it is likely that a large number could be induced to remain in the region if suitable opportunities could be made available for them in local information technology firms.

Further growth in the number of workers in this cluster has the potential to significantly impact upon the regional economy. For example, if it is assumed that regional efforts are successful in increasing the size of the cluster by fifteen percent by 2012, then the cumulative impact on Hampton Roads from 2004 to 2012 (including secondary impacts resulting from the multiplier process) will be

[45] The region faces a challenge in keeping these jobs over the long term since many companies are outsourcing IT jobs to places like India and China where there is an abundant supply of low-cost, well-trained labor in mathematics and computer science. One recent study predicted that one in ten IT jobs will go offshore by 2005 while forty to fifty percent of all IT jobs could be lost over the next five to ten years. Another predicted that America will lose 3.3 million IT jobs by 2015. However, these forecasts may prove to be overly pessimistic since firms have recently reported difficulties in making good use of foreign labor because of infrastructure problems which exist in those areas.

as follows: 1,311 new jobs, $19.1 change in annual regional per capita income, $12.0 change in the average annual regional wage, and a $1,608,720 collective net fiscal impact on all of the local governments in Hampton Roads.

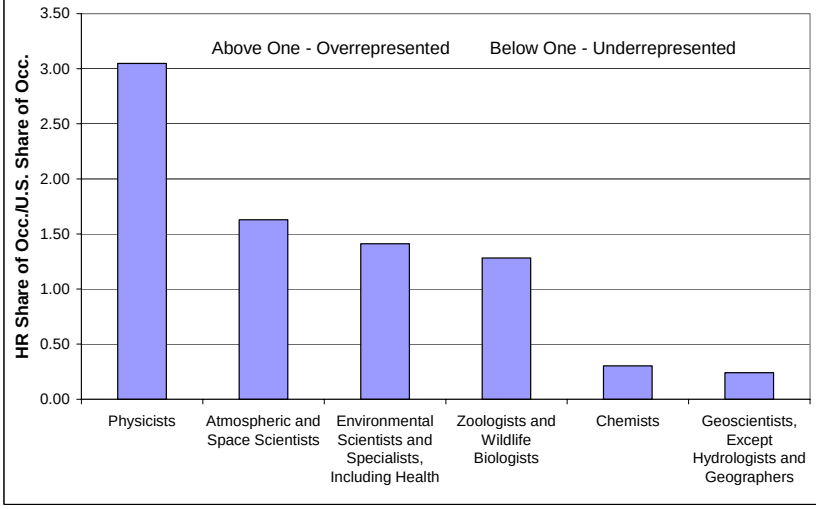
## Technical Services

### Background

The technical services cluster, as defined here, includes firms, which do engineering design and analysis as well as scientific research and testing.

The hallmark of any successful cluster is that it has an abundant supply of suitable labor. In the case of technical services, the region is well endowed with the sorts of occupations required by the cluster. In addition to having a large number of computer specialists, who this cluster requires as described above, the region also has a disproportionately large number of persons working in the areas of science and engineering. In fact, the region ranked 33 out of 317 MSAs in 2001 in the number of persons in architectural and engineering occupations. A more detailed view of the area's concentration in engineering is contained in Figure 5**,** which shows location quotients for engineering occupations tracked by the Bureau of Labor Statistics. As can be seen in the figure, Hampton Roads has above average representation in seven of the twelve engineering occupations in the Bureau's database. The area has particular strength in marine, nuclear, aerospace, and mechanical engineering.[46] The region's heavy representation in these areas reflects its long history in shipbuilding and aerospace research. Finally, the region has an above average representation in physicists, atmospheric and space scientists, environmental scientists, and zoologists and wildlife biologists as can be seen in Figure 6.

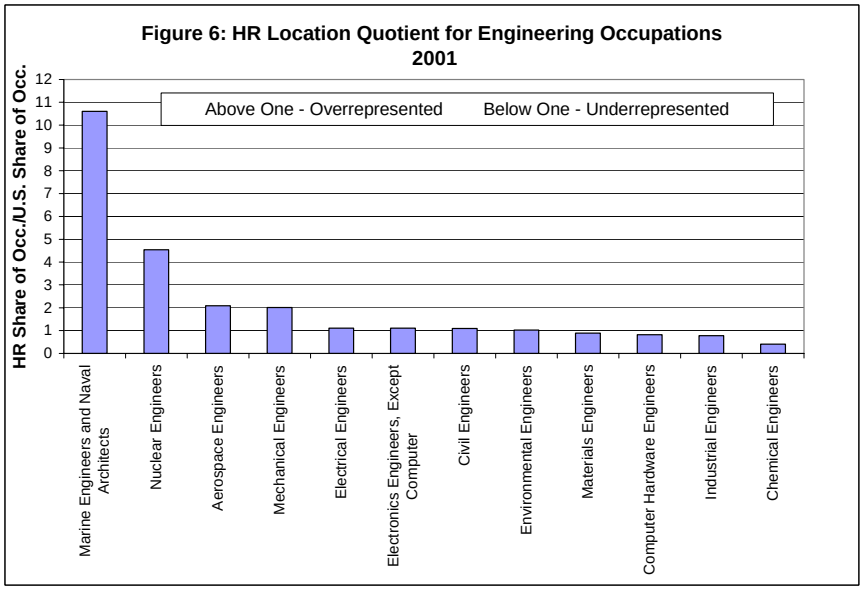
**Figure 5: HR Location Quotients for Selected Scientific Occupations 2001**




[46] In 2001, Hampton Roads was ranked third among the nation's MSAs in the number of marine engineers and eleventh in the number of aerospace engineers.

Selected Cluster Statistics

Currently, there are 425 firms populating this cluster. These firms employ over twelve thousand workers. Because production costs are well below the U.S. average, the cluster has grown at nearly double the region's average growth rate over the thirty-year period from 1970 to 2000. As a result, the cluster's location quotient increased from 0.76 in 1970 to 1.27 in 2000. The cluster appears to have a significant concentrated in Hampton Roads since its location quotient is considerably above one, and is even above 1.25, which some regard as an indication of strong cluster representation in a local economy.




The cluster's growth prospects appear good. Historically, the cluster grew faster from 1970 to 2000 than the same sector nationally suggesting a comparative advantage for the technical services cluster in Hampton Roads. In addition, the cluster grew seventy percent faster than the regional economy over the same period. Finally, cluster output is projected to grow faster than the U.S. average from 2002 to 2012 by the Bureau of Labor Statistics and faster than the regional average by REMI.

Further growth in the number of workers in this cluster has the potential to significantly impact upon the regional economy. For example, if it is assumed that regional efforts are successful in increasing the size of the cluster by fifteen percent by 2012, then the cumulative impact on Hampton Roads from 2004 to 2012 (including secondary impacts resulting from the multiplier process in the economy) will be as follows: 622 new jobs, $9.0 change in annual regional per capita income, $6.5 change in the average annual regional wage, and a $680,394 collective net fiscal impact on all of the local governments in Hampton Roads.

## Modeling and Simulation

Hampton Roads has developed significant capability in the field of computer modeling and simulation (M&S) in recent years. This capability has been developed, in large part, to meet the needs of the area's military facilities, defense contractors, and federal labs. In order to enhance the region's efforts in modeling and simulation, Old Dominion University has created the Virginia Modeling, Analysis, and Simulation Center (VMASC). Also to support the cluster, the university has created one of the country's most successful graduate programs in modeling and simulation and has recently graduated the nation's first PhD. in the field. The cluster's success can also be attributed to the presence of its large supply of technical workers including computer specialists, mathematicians, operations researchers, engineers, physical scientists, and subject specialists with deep knowledge of the area's within which simulations are conducted. Future growth in modeling and simulation is likely as various agencies of the federal government and others discover and find uses for M&S technology.

At present, the size, character, and future of the M&S cluster in Hampton Roads are not well known. For that reason, a study has been conducted to assess the nature of M&S in the region. This study was done cooperatively by VMASC, ANGLE Technology Group, the Hampton Roads Economic Development Alliance, the Peninsula Alliance for Economic Development, the Hampton Roads Partnership, and the Hampton Roads Planning District Commission. Results of that analysis are expected by early 2005. A detailed description of the M&S cluster along with its problems and prospects will be contained in the study's final report. Because little information or data on M&S was available at the time of this writing, readers interested in information on the region's M&S activities are encouraged to see the cluster impact report.[47]

## Sensors

The information revolution was spawned by the advent of computer technology. That revolution is continuing, in part, because sensors (small devices that can supply information on things that move, grow, make noise, and heat up) are being manufactured which can collect information for computer processing that had not formerly been available. In essence, the advent of sensors has made computers more useful while computers in turn have made sensors more useful. The industry, which manufactures sensors, is expected to grow at or above average growth rate for the U.S. economy. These rates of growth will be determined, in part, by the ability of producers to cut their costs through the achievement of economies of scale and to develop better, longer lasting sources of energy (Green, 2003).

[47] HRPDC assisted with the development of the survey instrument used in the study as well as the assessment of the cluster's economic impact on the region.

Hampton Roads is positioned to "ride" the wave of an accelerating demand for sensors since segments of the industry are already located in the region. In the future, sensors will be produced by firms dedicated to the manufacture of sensors as their primary line of business while sensors will also be produced by user industries. Industries and institutions likely to use sensors as an important part of their operations include the military, defense contractors, government agencies concerned about homeland security, transportation providers including airports, ports, railroads and airlines, communication firms, shippers, power plants, and manufacturing firms needing better or cheaper control over their production processes.

Currently, sensor producers are located in Hampton Roads in large part to meet the needs of the region's defense contractors, national labs and, most especially, military facilities since the American military is among the largest users of sensors.

According to figures published by the Census Bureau in County Business Patterns, the region had 20 firms making sensors employing fourteen hundred workers. These firms are members of an industry organization, the Sensors Science and Technology Forum established by the Hampton Roads Technology Council, devoted to promoting the local cluster. The Forum could be used as a nucleus around which the sensor cluster might be promoted in the region.

Selected Cluster Statistics

Growth rates for the sensor manufacturing industry are hard, if not impossible, to project given the rapid pace of change in the technologies incorporated into sensing devices. However, it might be assumed that growth rates will at least equal, if not exceed, the rate of growth for the nation and region as a whole.

Further growth in the number of workers in the cluster has the potential to significantly impact upon the regional economy. However, at this time, detailed estimates of the impact which might be generated by the cluster can not be made since sensor manufacturing is, and will continue to be, scattered across a host of different industries.

## CONCLUSIONS

This report has described the Commission's efforts to identify clusters, which might be further developed in Hampton Roads. Each of the clusters identified in this analysis are currently present in Hampton Roads although some are larger and better developed than others.

The methodology for selecting clusters began by identifying the universe of candidate clusters. From that universe, each cluster was examined in detail and ten where selected for discussion here.

These clusters were then presented to a steering committee of the Hampton Roads Partnership. The Partnership is currently working to selected a small number of these candidate clusters, which can be promoted regionally. A short list of final target clusters along with recommended actions for further developing each cluster is expected by the middle of 2005.

# Appendix A

Employment in Hampton Roads
Figures in Thousands

| | Hampton Roads | | | | Average Annual Change | | | |
|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970-1980 | 1980-1990 | 1990-2000 | 1970-2000 |
| Manufacturing | 58.568 | 72.282 | 75.221 | 72.081 | 1.371 | 0.294 | -0.314 | 0.450 |
| Lumber | 3.241 | 3.111 | 2.837 | 1.994 | -0.013 | -0.027 | -0.084 | -0.042 |
| Logging | 0.684 | 0.534 | 0.406 | 0.246 | -0.015 | -0.013 | -0.016 | -0.015 |
| Sawmills and planing mills | 1.543 | 1.059 | 0.839 | 0.451 | -0.048 | -0.022 | -0.039 | -0.036 |
| Millwork, plywood, and structural me | 0.509 | 0.759 | 0.885 | 0.791 | 0.025 | 0.013 | -0.009 | 0.009 |
| Wood containers and misc. wood p | 0.460 | 0.729 | 0.677 | 0.460 | 0.027 | -0.005 | -0.022 | 0.000 |
| Wood buildings and mobile homes | 0.044 | 0.029 | 0.030 | 0.047 | -0.002 | 0.000 | 0.002 | 0.000 |
| Furniture | 0.378 | 0.437 | 0.610 | 0.373 | 0.006 | 0.017 | -0.024 | 0.000 |
| Household furniture | 0.254 | 0.362 | 0.487 | 0.283 | 0.011 | 0.013 | -0.020 | 0.001 |
| Partitions and fixtures | 0.090 | 0.054 | 0.090 | 0.061 | -0.004 | 0.004 | -0.003 | -0.001 |
| Office and misc. furniture and fixture | 0.033 | 0.022 | 0.033 | 0.029 | -0.001 | 0.001 | 0.000 | 0.000 |
| Stone,Clay,Etc. | 1.728 | 1.911 | 2.617 | 2.352 | 0.018 | 0.071 | -0.027 | 0.021 |
| Glass and glass products | 0.304 | 0.484 | 0.715 | 0.501 | 0.018 | 0.023 | -0.021 | 0.007 |
| Hydraulic cement | 0.196 | 0.119 | 0.090 | 0.084 | -0.008 | -0.003 | -0.001 | -0.004 |
| Stone, clay, and misc. mineral prodi | 0.289 | 0.596 | 0.789 | 0.685 | 0.031 | 0.019 | -0.010 | 0.013 |
| Concrete, gypsum, & plaster produc | 0.939 | 0.712 | 1.023 | 1.083 | -0.023 | 0.031 | 0.006 | 0.005 |
| Primary Metals | 0.828 | 1.219 | 1.794 | 2.733 | 0.039 | 0.058 | 0.094 | 0.064 |
| Blast furnaces and basic steel prodi | 0.031 | 0.035 | 0.027 | 0.035 | 0.000 | -0.001 | 0.001 | 0.000 |
| Iron and steel foundries | 0.107 | 0.135 | 0.123 | 0.178 | 0.003 | -0.001 | 0.006 | 0.002 |
| Primary nonferrous smelting & refin | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| All other primary metals | 0.003 | 0.006 | 0.010 | 0.013 | 0.000 | 0.000 | 0.000 | 0.000 |
| Nonferrous rolling and drawing | 0.148 | 0.201 | 0.235 | 0.377 | 0.005 | 0.003 | 0.014 | 0.008 |
| Nonferrous foundries | 0.538 | 0.842 | 1.398 | 2.129 | 0.030 | 0.056 | 0.073 | 0.053 |
| Fabricated Metals | 1.276 | 1.573 | 1.590 | 2.234 | 0.030 | 0.002 | 0.064 | 0.032 |
| Metal cans and shipping containers | 0.324 | 0.145 | 0.180 | 0.225 | -0.018 | 0.004 | 0.005 | -0.003 |
| Cutlery, hand tools, and hardware | 0.008 | 0.004 | 0.003 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 |
| Plumbing and nonelectric heating e | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Fabricated structural metal products | 0.506 | 1.049 | 0.997 | 1.373 | 0.054 | -0.005 | 0.038 | 0.029 |
| Screw machine products, bolts, rive | 0.280 | 0.146 | 0.134 | 0.187 | -0.013 | -0.001 | 0.005 | -0.003 |
| Metal forgings and stampings | 0.034 | 0.056 | 0.065 | 0.104 | 0.002 | 0.001 | 0.004 | 0.002 |
| Metal coating, engraving, and allied | 0.055 | 0.035 | 0.085 | 0.191 | -0.002 | 0.005 | 0.011 | 0.005 |
| Ordnance and ammunition | 0.002 | 0.003 | 0.004 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 |
| Miscellaneous fabricated metal proc | 0.067 | 0.134 | 0.121 | 0.148 | 0.007 | -0.001 | 0.003 | 0.003 |
| Machin & Comput | 1.438 | 2.846 | 3.433 | 8.460 | 0.141 | 0.059 | 0.503 | 0.234 |
| Engines and turbines | 0.002 | 0.003 | 0.004 | 0.007 | 0.000 | 0.000 | 0.000 | 0.000 |
| Farm and garden machinery and ec | 0.254 | 0.481 | 0.587 | 0.905 | 0.023 | 0.011 | 0.032 | 0.022 |
| Construction and related machinery | 0.258 | 0.429 | 0.438 | 0.931 | 0.017 | 0.001 | 0.049 | 0.022 |
| Metalworking machinery and equipr | 0.214 | 0.308 | 0.416 | 0.907 | 0.009 | 0.011 | 0.049 | 0.023 |
| Special industry machinery | 0.031 | 0.054 | 0.049 | 0.192 | 0.002 | -0.001 | 0.014 | 0.005 |
| General industrial machinery and ec | 0.226 | 0.425 | 0.670 | 1.180 | 0.020 | 0.025 | 0.051 | 0.032 |
| Computer and office equipment | 0.303 | 0.872 | 0.818 | 3.234 | 0.057 | -0.005 | 0.242 | 0.098 |
| Refrigeration and service industry m | 0.090 | 0.113 | 0.217 | 0.442 | 0.002 | 0.010 | 0.023 | 0.012 |
| Industrial machinery, nec | 0.059 | 0.160 | 0.234 | 0.661 | 0.010 | 0.007 | 0.043 | 0.020 |
| Electric Equip | 0.272 | 0.958 | 1.571 | 2.333 | 0.069 | 0.061 | 0.076 | 0.069 |
| Electric distribution equipment | 0.007 | 0.013 | 0.011 | 0.024 | 0.001 | 0.000 | 0.001 | 0.001 |
| Electrical industrial apparatus | 0.134 | 0.316 | 0.257 | 0.528 | 0.018 | -0.006 | 0.027 | 0.013 |
| Household appliances | 0.013 | 0.023 | 0.017 | 0.042 | 0.001 | -0.001 | 0.003 | 0.001 |
| Electric lighting and wiring equipme | 0.019 | 0.082 | 0.159 | 0.189 | 0.006 | 0.008 | 0.003 | 0.006 |
| Household audio and video equipm | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Communications equipment | 0.009 | 0.101 | 0.293 | 0.299 | 0.009 | 0.019 | 0.001 | 0.010 |
| Electronic components and accesso | 0.075 | 0.234 | 0.271 | 0.766 | 0.016 | 0.004 | 0.050 | 0.023 |
| Miscellaneous electrical equipment | 0.015 | 0.189 | 0.563 | 0.486 | 0.017 | 0.037 | -0.008 | 0.016 |

Employment in Hampton Roads
Figures in Thousands

| | Hampton Roads | | | | Average Annual Change | | | |
|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970-1980 | 1980-1990 | 1990-2000 | 1970-2000 |
| Motor Vehicles | 1.105 | 2.444 | 2.658 | 3.359 | 0.134 | 0.021 | 0.070 | 0.075 |
| Rest Trans Equip | 22.745 | 28.478 | 31.124 | 22.740 | 0.573 | 0.265 | -0.838 | 0.000 |
| Aerospace | 0.001 | 0.004 | 0.006 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 |
| Ship and boat building and repairing | 22.742 | 28.467 | 31.110 | 22.727 | 0.573 | 0.264 | -0.838 | -0.001 |
| Railroad equipment | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Miscellaneous transportation equipr | 0.002 | 0.006 | 0.008 | 0.010 | 0.000 | 0.000 | 0.000 | 0.000 |
| Instruments | 0.607 | 0.806 | 2.640 | 1.247 | 0.020 | 0.183 | -0.139 | 0.021 |
| Search and navigation equipment | 0.109 | 0.337 | 0.796 | 0.357 | 0.023 | 0.046 | -0.044 | 0.008 |
| Measuring and controlling devices | 0.029 | 0.074 | 0.624 | 0.204 | 0.005 | 0.055 | -0.042 | 0.006 |
| Medical equipment, instruments and | 0.027 | 0.065 | 0.875 | 0.323 | 0.004 | 0.081 | -0.055 | 0.010 |
| Ophthalmic goods | 0.130 | 0.107 | 0.052 | 0.139 | -0.002 | -0.006 | 0.009 | 0.000 |
| Photographic equipment and suppli | 0.311 | 0.223 | 0.293 | 0.224 | -0.009 | 0.007 | -0.007 | -0.003 |
| Watches, clocks, and parts | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Misc. Manufact | 1.262 | 0.882 | 0.636 | 1.605 | -0.038 | -0.025 | 0.097 | 0.011 |
| Jewelry, silverware, and plated ware | 0.194 | 0.084 | 0.040 | 0.090 | -0.011 | -0.004 | 0.005 | -0.003 |
| Toys and sporting goods | 0.538 | 0.223 | 0.135 | 0.318 | -0.032 | -0.009 | 0.018 | -0.007 |
| Manufactured products, nec | 0.529 | 0.575 | 0.461 | 1.196 | 0.005 | -0.011 | 0.074 | 0.022 |
| Food | 12.953 | 16.418 | 11.543 | 11.299 | 0.347 | -0.488 | -0.024 | -0.055 |
| Meat products | 7.939 | 7.893 | 5.534 | 6.312 | -0.005 | -0.236 | 0.078 | -0.054 |
| Dairy products | 0.482 | 0.428 | 0.376 | 0.267 | -0.005 | -0.005 | -0.011 | -0.007 |
| Preserved fruits and vegetables | 0.183 | 0.370 | 0.222 | 0.189 | 0.019 | -0.015 | -0.003 | 0.000 |
| Grain mill products and fats and oils | 0.439 | 0.966 | 0.481 | 0.437 | 0.053 | -0.049 | -0.004 | 0.000 |
| Bakery products | 0.758 | 1.393 | 0.808 | 0.718 | 0.064 | -0.059 | -0.009 | -0.001 |
| Sugar and confectionery products | 0.511 | 0.925 | 0.533 | 0.461 | 0.041 | -0.039 | -0.007 | -0.002 |
| Beverages | 1.683 | 2.179 | 1.862 | 1.414 | 0.050 | -0.032 | -0.045 | -0.009 |
| Miscellaneous food and kindred pro | 0.959 | 2.263 | 1.727 | 1.502 | 0.130 | -0.054 | -0.023 | 0.018 |
| Tobacco Manuf | 0.001 | 0.003 | 0.001 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 |
| Textiles | 0.608 | 0.702 | 0.518 | 0.393 | 0.009 | -0.018 | -0.013 | -0.007 |
| Weaving, finishing, yarn, and thread | 0.549 | 0.631 | 0.461 | 0.336 | 0.008 | -0.017 | -0.013 | -0.007 |
| Knitting mills | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Carpets and rugs | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Miscellaneous textile goods | 0.059 | 0.071 | 0.057 | 0.057 | 0.001 | -0.001 | 0.000 | 0.000 |
| Apparel | 1.448 | 1.427 | 1.419 | 0.859 | -0.002 | -0.001 | -0.056 | -0.020 |
| Apparel | 0.777 | 0.732 | 0.657 | 0.184 | -0.005 | -0.008 | -0.047 | -0.020 |
| Miscellaneous fabricated textile pro | 0.671 | 0.695 | 0.762 | 0.676 | 0.002 | 0.007 | -0.009 | 0.000 |
| Paper | 0.826 | 0.961 | 1.090 | 1.290 | 0.014 | 0.013 | 0.020 | 0.015 |
| Pulp, paper, and paperboard mills | 0.183 | 0.299 | 0.376 | 0.445 | 0.012 | 0.008 | 0.007 | 0.009 |
| Paperboard containers and boxes | 0.200 | 0.175 | 0.182 | 0.229 | -0.003 | 0.001 | 0.005 | 0.001 |
| Converted paper products except c | 0.443 | 0.487 | 0.532 | 0.617 | 0.004 | 0.005 | 0.009 | 0.006 |
| Printing | 2.715 | 3.997 | 5.038 | 5.566 | 0.128 | 0.104 | 0.053 | 0.095 |
| Newspapers | 1.861 | 2.280 | 2.565 | 2.580 | 0.042 | 0.029 | 0.002 | 0.024 |
| Periodicals | 0.113 | 0.145 | 0.226 | 0.308 | 0.003 | 0.008 | 0.008 | 0.007 |
| Books | 0.080 | 0.085 | 0.114 | 0.146 | 0.001 | 0.003 | 0.003 | 0.002 |
| Miscellaneous publishing | 0.027 | 0.067 | 0.125 | 0.176 | 0.004 | 0.006 | 0.005 | 0.005 |
| Commercial printing and business f | 0.604 | 1.371 | 1.937 | 2.288 | 0.077 | 0.057 | 0.035 | 0.056 |
| Greeting cards | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Blankbooks and bookbinding | 0.013 | 0.015 | 0.020 | 0.020 | 0.000 | 0.001 | 0.000 | 0.000 |
| Service industries for the printing tra | 0.017 | 0.034 | 0.051 | 0.046 | 0.002 | 0.002 | -0.001 | 0.001 |

Employment in Hampton Roads
Figures in Thousands

| | Hampton Roads | | | | Average Annual Change | | | |
|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970-1980 | 1980-1990 | 1990-2000 | 1970-2000 |
| Chemicals | 3.436 | 2.364 | 1.746 | 1.107 | -0.107 | -0.062 | -0.064 | -0.078 |
| Industrial chemicals | 1.059 | 1.011 | 0.723 | 0.365 | -0.005 | -0.029 | -0.036 | -0.023 |
| Plastics materials and synthetics | 1.092 | 0.394 | 0.295 | 0.215 | -0.070 | -0.010 | -0.008 | -0.029 |
| Drugs | 0.084 | 0.045 | 0.046 | 0.052 | -0.004 | 0.000 | 0.001 | -0.001 |
| Soap, cleaners, and toilet goods | 0.101 | 0.047 | 0.044 | 0.037 | -0.005 | 0.000 | -0.001 | -0.002 |
| Paints and allied products | 0.264 | 0.127 | 0.096 | 0.041 | -0.014 | -0.003 | -0.006 | -0.007 |
| Agricultural chemicals | 0.461 | 0.459 | 0.293 | 0.196 | 0.000 | -0.017 | -0.010 | -0.009 |
| Miscellaneous chemical products | 0.375 | 0.280 | 0.250 | 0.201 | -0.010 | -0.003 | -0.005 | -0.006 |
| Petro Products | 0.274 | 0.311 | 0.384 | 0.423 | 0.004 | 0.007 | 0.004 | 0.005 |
| Petroleum refining | 0.264 | 0.302 | 0.364 | 0.419 | 0.004 | 0.006 | 0.006 | 0.005 |
| Miscellaneous petroleum and coal p | 0.010 | 0.009 | 0.020 | 0.003 | 0.000 | 0.001 | -0.002 | 0.000 |
| Rubber | 1.424 | 1.429 | 1.972 | 1.712 | 0.001 | 0.054 | -0.026 | 0.010 |
| Tires and inner tubes | 0.019 | 0.012 | 0.012 | 0.014 | -0.001 | 0.000 | 0.000 | 0.000 |
| Rubber products and plastic hose a | 0.866 | 0.870 | 1.015 | 0.815 | 0.000 | 0.015 | -0.020 | -0.002 |
| Miscellaneous plastics products, ne | 0.539 | 0.548 | 0.944 | 0.883 | 0.001 | 0.040 | -0.006 | 0.011 |
| Leather | 0.003 | 0.005 | 0.000 | 0.000 | 0.000 | -0.001 | 0.000 | 0.000 |
| Footwear, except rubber and plastic | 0.002 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Luggage, handbags, and leather pr | 0.001 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Mining | 0.152 | 0.169 | 0.439 | 0.361 | 0.002 | 0.027 | -0.008 | 0.007 |
| Metal mining | 0.034 | 0.027 | 0.074 | 0.030 | -0.001 | 0.005 | -0.004 | 0.000 |
| Coal mining | 0.013 | 0.023 | 0.039 | 0.023 | 0.001 | 0.002 | -0.002 | 0.000 |
| Crude petroleum, natural gas and gas li | 0.009 | 0.014 | 0.036 | 0.026 | 0.001 | 0.002 | -0.001 | 0.001 |
| Oil and gas field services | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Nonmetallic minerals, except fuels | 0.097 | 0.105 | 0.291 | 0.282 | 0.001 | 0.019 | -0.001 | 0.006 |
| Construction | 27.902 | 35.651 | 49.030 | 56.528 | 0.775 | 1.338 | 0.750 | 0.954 |
| Trans.&Public Util. | 22.764 | 26.266 | 33.057 | 39.477 | 0.350 | 0.679 | 0.642 | 0.557 |
| Railroad | 3.445 | 2.515 | 1.617 | 1.217 | -0.093 | -0.090 | -0.040 | -0.074 |
| Trucking | 4.143 | 5.917 | 7.704 | 10.032 | 0.177 | 0.179 | 0.233 | 0.196 |
| Local&Interurban | 2.997 | 2.437 | 2.367 | 2.890 | -0.056 | -0.007 | 0.052 | -0.004 |
| Air Transportation | 0.606 | 1.076 | 2.892 | 4.319 | 0.047 | 0.182 | 0.143 | 0.124 |
| Other Transport | 5.076 | 6.046 | 7.070 | 9.779 | 0.097 | 0.102 | 0.271 | 0.157 |
| Water transportation | 4.714 | 5.157 | 5.288 | 6.742 | 0.044 | 0.013 | 0.145 | 0.068 |
| Pipelines, except natural gas | 0.011 | 0.014 | 0.014 | 0.011 | 0.000 | 0.000 | 0.000 | 0.000 |
| Passenger transportation arrangem | 0.144 | 0.410 | 0.931 | 1.469 | 0.027 | 0.052 | 0.054 | 0.044 |
| Miscellaneous transportation servic | 0.207 | 0.466 | 0.837 | 1.557 | 0.026 | 0.037 | 0.072 | 0.045 |
| Communication | 4.275 | 5.583 | 6.898 | 8.498 | 0.131 | 0.132 | 0.160 | 0.141 |
| Public Utilities | 2.222 | 2.692 | 4.508 | 2.741 | 0.047 | 0.182 | -0.177 | 0.017 |
| Electric utilities | 1.420 | 1.752 | 2.779 | 1.435 | 0.033 | 0.103 | -0.134 | 0.001 |
| Gas utilities | 0.549 | 0.578 | 0.799 | 0.409 | 0.003 | 0.022 | -0.039 | -0.005 |
| Water and sanitation | 0.254 | 0.363 | 0.930 | 0.897 | 0.011 | 0.057 | -0.003 | 0.021 |

Employment in Hampton Roads
Figures in Thousands

| | Hampton Roads | | | | Average Annual Change | | | |
|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970-1980 | 1980-1990 | 1990-2000 | 1970-2000 |
| Fin&Ins&Real Est | 24.534 | 39.884 | 50.130 | 63.718 | 1.535 | 1.025 | 1.359 | 1.306 |
| Banking | 5.095 | 8.470 | 11.891 | 15.065 | 0.338 | 0.342 | 0.317 | 0.332 |
| Insurance | 3.236 | 4.899 | 5.661 | 10.413 | 0.166 | 0.076 | 0.475 | 0.239 |
| Insurance carriers | 2.197 | 3.071 | 3.336 | 6.213 | 0.087 | 0.027 | 0.288 | 0.134 |
| Insurance agents, brokers, and serv | 1.039 | 1.828 | 2.325 | 4.200 | 0.079 | 0.050 | 0.188 | 0.105 |
| Credit & Finance | 3.906 | 6.053 | 5.633 | 8.077 | 0.215 | -0.042 | 0.244 | 0.139 |
| Nondepository; holding and investm | 2.692 | 4.052 | 3.666 | 4.933 | 0.136 | -0.039 | 0.127 | 0.075 |
| Security and commodity brokers | 1.214 | 2.001 | 1.967 | 3.144 | 0.079 | -0.003 | 0.118 | 0.064 |
| Real Estate | 12.297 | 20.462 | 26.945 | 30.163 | 0.817 | 0.648 | 0.322 | 0.596 |
| Retail Trade | 67.074 | 90.358 | 138.464 | 160.197 | 2.328 | 4.811 | 2.173 | 3.104 |
| Eating & Drinking | 12.596 | 24.332 | 43.342 | 53.663 | 1.174 | 1.901 | 1.032 | 1.369 |
| Rest of Retail | 54.478 | 66.026 | 95.122 | 106.534 | 1.155 | 2.910 | 1.141 | 1.735 |
| Wholesale Trade | 15.270 | 22.574 | 28.711 | 31.239 | 0.730 | 0.614 | 0.253 | 0.532 |
| Services | 82.748 | 124.452 | 202.185 | 272.418 | 4.170 | 7.773 | 7.023 | 6.322 |
| Hotels | 6.744 | 11.252 | 13.377 | 14.675 | 0.451 | 0.213 | 0.130 | 0.264 |
| Pers Serv & Rep | 11.990 | 14.369 | 20.127 | 22.903 | 0.238 | 0.576 | 0.278 | 0.364 |
| Laundry, cleaning, and shoe repair | 2.195 | 3.264 | 4.080 | 4.254 | 0.107 | 0.082 | 0.017 | 0.069 |
| Personal services, nec | 0.493 | 1.075 | 2.421 | 3.556 | 0.058 | 0.135 | 0.114 | 0.102 |
| Beauty and barber shops | 5.340 | 5.389 | 7.218 | 8.743 | 0.005 | 0.183 | 0.153 | 0.113 |
| Funeral service and crematories | 0.513 | 0.510 | 0.729 | 0.851 | 0.000 | 0.022 | 0.012 | 0.011 |
| Electrical repair shops | 1.006 | 1.210 | 1.656 | 1.486 | 0.020 | 0.045 | -0.017 | 0.016 |
| Watch, jewelry, & furniture repair | 0.474 | 0.475 | 0.505 | 0.521 | 0.000 | 0.003 | 0.002 | 0.002 |
| Miscellaneous repair services | 1.970 | 2.445 | 3.518 | 3.493 | 0.048 | 0.107 | -0.002 | 0.051 |
| Private Household | 17.364 | 13.098 | 8.189 | 7.015 | -0.427 | -0.491 | -0.117 | -0.345 |
| Auto Rep&Serv | 2.656 | 4.092 | 7.750 | 9.181 | 0.144 | 0.366 | 0.143 | 0.218 |
| Automotive rentals, without drivers | 0.444 | 0.843 | 1.573 | 1.732 | 0.040 | 0.073 | 0.016 | 0.043 |
| Automobile parking, repair, and ser | 2.212 | 3.249 | 6.177 | 7.449 | 0.104 | 0.293 | 0.127 | 0.175 |
| Misc. Bus Serv | 5.827 | 16.047 | 38.136 | 63.291 | 1.022 | 2.209 | 2.516 | 1.915 |
| Advertising | 0.907 | 1.026 | 1.845 | 1.977 | 0.012 | 0.082 | 0.013 | 0.036 |
| Services to buildings | 2.333 | 3.531 | 7.715 | 7.911 | 0.120 | 0.418 | 0.020 | 0.186 |
| Miscellaneous equipment rental and | 0.099 | 0.508 | 1.315 | 1.626 | 0.041 | 0.081 | 0.031 | 0.051 |
| Personnel supply services | 0.747 | 2.971 | 9.770 | 23.338 | 0.222 | 0.680 | 1.357 | 0.753 |
| Computer and data processing serv | 0.278 | 1.323 | 4.038 | 10.039 | 0.105 | 0.272 | 0.600 | 0.325 |
| Miscellaneous business services | 1.464 | 6.689 | 13.453 | 18.400 | 0.523 | 0.676 | 0.495 | 0.565 |
| Amusem & Recr | 3.040 | 6.238 | 10.977 | 14.487 | 0.320 | 0.474 | 0.351 | 0.382 |
| Producers, orchestras, and entertai | 1.192 | 0.901 | 1.838 | 2.843 | -0.029 | 0.094 | 0.101 | 0.055 |
| Bowling centers | 0.336 | 0.877 | 0.951 | 0.734 | 0.054 | 0.007 | -0.022 | 0.013 |
| Commercial sports | 0.085 | 0.056 | 0.093 | 0.168 | -0.003 | 0.004 | 0.008 | 0.003 |
| Amusement and recreation services | 1.426 | 4.405 | 8.095 | 10.743 | 0.298 | 0.369 | 0.265 | 0.311 |
| Motion Pictures | 1.359 | 1.373 | 1.853 | 3.069 | 0.001 | 0.048 | 0.122 | 0.057 |
| Motion pictures | 1.035 | 0.913 | 0.878 | 1.663 | -0.012 | -0.004 | 0.079 | 0.021 |
| Video tape rental | 0.324 | 0.460 | 0.975 | 1.406 | 0.014 | 0.052 | 0.043 | 0.036 |

Employment in Hampton Roads
Figures in Thousands

| | Hampton Roads | | | | Average Annual Change | | | |
|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970-1980 | 1980-1990 | 1990-2000 | 1970-2000 |
| Medical | 15.952 | 30.132 | 48.247 | 55.735 | 1.418 | 1.812 | 0.749 | 1.326 |
| Offices of health practitioners | 3.688 | 9.232 | 16.001 | 19.498 | 0.554 | 0.677 | 0.350 | 0.527 |
| Nursing and personal care facilities | 2.262 | 4.295 | 6.666 | 7.693 | 0.203 | 0.237 | 0.103 | 0.181 |
| Hospitals | 9.389 | 14.833 | 21.124 | 21.594 | 0.544 | 0.629 | 0.047 | 0.407 |
| Health services, nec | 0.613 | 1.772 | 4.456 | 6.950 | 0.116 | 0.268 | 0.249 | 0.211 |
| Misc. Prof Serv | 6.490 | 13.138 | 28.097 | 41.485 | 0.665 | 1.496 | 1.339 | 1.167 |
| Legal services | 1.774 | 2.762 | 5.995 | 7.586 | 0.099 | 0.323 | 0.159 | 0.194 |
| Engineering and architectural servic | 2.771 | 4.302 | 8.394 | 12.335 | 0.153 | 0.409 | 0.394 | 0.319 |
| Research and testing services | 0.882 | 2.357 | 5.010 | 6.928 | 0.148 | 0.265 | 0.192 | 0.202 |
| Management and public relations | 0.484 | 1.490 | 4.320 | 8.727 | 0.101 | 0.283 | 0.441 | 0.275 |
| Accounting, auditing, and other serv | 0.578 | 2.228 | 4.377 | 5.909 | 0.165 | 0.215 | 0.153 | 0.178 |
| Education | 3.535 | 6.128 | 9.257 | 13.932 | 0.259 | 0.313 | 0.468 | 0.347 |
| Non-Profit Org | 7.791 | 8.586 | 16.176 | 26.646 | 0.080 | 0.759 | 1.047 | 0.629 |
| Individual and miscellaneous social | 0.516 | 0.887 | 1.796 | 3.379 | 0.037 | 0.091 | 0.158 | 0.095 |
| Job training and related services | 0.356 | 0.649 | 1.101 | 1.983 | 0.029 | 0.045 | 0.088 | 0.054 |
| Child day care services | 1.575 | 1.879 | 3.652 | 6.395 | 0.030 | 0.177 | 0.274 | 0.161 |
| Residential care | 0.308 | 0.471 | 1.410 | 2.547 | 0.016 | 0.094 | 0.114 | 0.075 |
| Museums, botanical, zoological gar | 0.189 | 0.248 | 0.722 | 1.183 | 0.006 | 0.047 | 0.046 | 0.033 |
| Membership organizations | 4.847 | 4.452 | 7.493 | 11.159 | -0.040 | 0.304 | 0.367 | 0.210 |
| Agri&For&Fish Serv | 2.224 | 3.784 | 6.145 | 9.149 | 0.156 | 0.236 | 0.300 | 0.231 |
| Agricultural services | 2.080 | 3.526 | 5.849 | 8.860 | 0.145 | 0.232 | 0.301 | 0.226 |
| Forestry, fishing, hunting, & trapping | 0.144 | 0.258 | 0.296 | 0.289 | 0.011 | 0.004 | -0.001 | 0.005 |
| Government | 232.125 | 242.689 | 284.286 | 259.580 | 1.056 | 4.160 | -2.471 | 0.915 |
| State and Local | 47.475 | 68.481 | 81.909 | 101.525 | 2.101 | 1.343 | 1.962 | 1.802 |
| State | 0.000 | 16.885 | 19.732 | 22.792 | 1.689 | 0.285 | 0.306 | 0.760 |
| Local | 0.000 | 51.596 | 62.177 | 78.733 | 5.160 | 1.058 | 1.656 | 2.624 |
| Federal Civilian | 53.461 | 54.310 | 59.698 | 46.790 | 0.085 | 0.539 | -1.291 | -0.222 |
| Federal Military | 131.189 | 119.898 | 142.679 | 111.265 | -1.129 | 2.278 | -3.141 | -0.664 |
| Farm | 8.719 | 5.037 | 3.019 | 2.547 | -0.368 | -0.202 | -0.047 | -0.206 |
| Total | 542.080 | 663.146 | 870.687 | 967.295 | 12.107 | 20.754 | 9.661 | 14.174 |

# Appendix B - 1

Hampton Roads Location Quotients Based on Employment

| | Hampton Roads | | | | U.S. | | | | Location Quotients | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 |
| Manufacturing | 58.568 | 72.282 | 75.221 | 72.081 | 19687.395 | 20781.109 | 19697.203 | 19110.902 | 0.50 | 0.60 | 0.61 | 0.65 |
| Lumber | 3.241 | 3.111 | 2.837 | 1.994 | 674.509 | 809.740 | 860.300 | 930.100 | 0.81 | 0.66 | 0.53 | 0.37 |
| Logging | 0.684 | 0.534 | 0.406 | 0.246 | 154.435 | 150.748 | 134.269 | 123.917 | 0.75 | 0.61 | 0.48 | 0.34 |
| Sawmills and planing mills | 1.543 | 1.059 | 0.839 | 0.451 | 277.232 | 228.644 | 218.214 | 195.925 | 0.94 | 0.80 | 0.62 | 0.40 |
| Millwork, plywood, and structural me | 0.509 | 0.759 | 0.885 | 0.791 | 111.807 | 219.361 | 288.433 | 356.105 | 0.77 | 0.60 | 0.49 | 0.38 |
| Wood containers and misc. wood pi | 0.460 | 0.729 | 0.677 | 0.460 | 72.343 | 144.795 | 156.186 | 159.144 | 1.07 | 0.87 | 0.69 | 0.50 |
| Wood buildings and mobile homes | 0.044 | 0.029 | 0.030 | 0.047 | 58.692 | 66.192 | 63.198 | 95.010 | 0.13 | 0.08 | 0.08 | 0.09 |
| Furniture | 0.378 | 0.437 | 0.610 | 0.373 | 468.700 | 477.000 | 535.400 | 597.600 | 0.14 | 0.16 | 0.18 | 0.11 |
| Household furniture | 0.254 | 0.362 | 0.487 | 0.283 | 191.445 | 302.993 | 298.317 | 313.833 | 0.22 | 0.21 | 0.26 | 0.16 |
| Partitions and fixtures | 0.090 | 0.054 | 0.090 | 0.061 | 100.699 | 64.941 | 82.989 | 97.198 | 0.15 | 0.14 | 0.17 | 0.11 |
| Office and misc. furniture and fixtur | 0.033 | 0.022 | 0.033 | 0.029 | 176.556 | 109.066 | 154.094 | 186.570 | 0.03 | 0.03 | 0.03 | 0.03 |
| Stone,Clay,Etc. | 1.728 | 1.911 | 2.617 | 2.352 | 635.057 | 665.753 | 610.500 | 606.500 | 0.46 | 0.49 | 0.69 | 0.67 |
| Glass and glass products | 0.304 | 0.484 | 0.715 | 0.501 | 157.539 | 198.930 | 175.328 | 151.273 | 0.32 | 0.42 | 0.65 | 0.57 |
| Hydraulic cement | 0.196 | 0.119 | 0.090 | 0.084 | 53.804 | 32.776 | 19.635 | 17.826 | 0.61 | 0.63 | 0.73 | 0.82 |
| Stone, clay, and misc. mineral prod | 0.289 | 0.596 | 0.789 | 0.685 | 118.879 | 217.230 | 192.402 | 187.328 | 0.41 | 0.47 | 0.66 | 0.63 |
| Concrete, gypsum, & plaster produc | 0.939 | 0.712 | 1.023 | 1.083 | 304.836 | 216.817 | 223.135 | 250.073 | 0.52 | 0.57 | 0.73 | 0.75 |
| Primary Metals | 0.828 | 1.219 | 1.794 | 2.733 | 1315.900 | 1154.500 | 758.900 | 707.500 | 0.11 | 0.18 | 0.38 | 0.67 |
| Blast furnaces and basic steel prod | 0.031 | 0.035 | 0.027 | 0.035 | 654.096 | 516.463 | 276.625 | 227.945 | 0.01 | 0.01 | 0.02 | 0.03 |
| Iron and steel foundries | 0.107 | 0.135 | 0.123 | 0.178 | 238.792 | 210.661 | 131.983 | 124.187 | 0.08 | 0.11 | 0.15 | 0.25 |
| Primary nonferrous smelting & refin | 0.000 | 0.000 | 0.000 | 0.000 | 75.633 | 73.247 | 49.344 | 36.912 | 0.00 | 0.00 | 0.00 | 0.00 |
| All other primary metals | 0.003 | 0.006 | 0.010 | 0.013 | 38.901 | 50.647 | 45.955 | 45.104 | 0.01 | 0.02 | 0.03 | 0.05 |
| Nonferrous rolling and drawing | 0.148 | 0.201 | 0.235 | 0.377 | 221.892 | 212.477 | 171.757 | 178.190 | 0.11 | 0.16 | 0.22 | 0.37 |
| Nonferrous foundries | 0.538 | 0.842 | 1.398 | 2.129 | 86.587 | 91.004 | 83.237 | 95.163 | 1.05 | 1.59 | 2.69 | 3.87 |
| Fabricated Metals | 1.276 | 1.573 | 1.590 | 2.234 | 1453.400 | 1632.600 | 1444.100 | 1596.400 | 0.15 | 0.17 | 0.18 | 0.24 |
| Metal cans and shipping containers | 0.324 | 0.145 | 0.180 | 0.225 | 178.127 | 76.040 | 50.980 | 36.623 | 0.31 | 0.33 | 0.57 | 1.06 |
| Cutlery, hand tools, and hardware | 0.008 | 0.004 | 0.003 | 0.004 | 294.670 | 166.344 | 133.873 | 137.105 | 0.00 | 0.00 | 0.00 | 0.01 |
| Plumbing and nonelectric heating e | 0.000 | 0.000 | 0.000 | 0.000 | 39.303 | 72.022 | 60.112 | 60.698 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fabricated structural metal products | 0.506 | 1.049 | 0.997 | 1.373 | 241.480 | 517.313 | 441.660 | 508.432 | 0.35 | 0.35 | 0.36 | 0.47 |
| Screw machine products, bolts, rive | 0.280 | 0.146 | 0.134 | 0.187 | 203.462 | 110.193 | 95.939 | 118.335 | 0.23 | 0.23 | 0.22 | 0.27 |
| Metal forgings and stampings | 0.034 | 0.056 | 0.065 | 0.104 | 157.430 | 261.369 | 226.600 | 259.827 | 0.04 | 0.04 | 0.05 | 0.07 |
| Metal coating, engraving, and allied | 0.055 | 0.035 | 0.085 | 0.191 | 169.357 | 102.358 | 120.626 | 149.347 | 0.05 | 0.06 | 0.11 | 0.22 |
| Ordnance and ammunition | 0.002 | 0.003 | 0.004 | 0.002 | 44.584 | 64.589 | 75.165 | 39.887 | 0.01 | 0.01 | 0.01 | 0.01 |
| Miscellaneous fabricated metal proc | 0.067 | 0.134 | 0.121 | 0.148 | 124.986 | 262.373 | 239.145 | 286.146 | 0.09 | 0.09 | 0.08 | 0.09 |
| Machin & Comput | 1.438 | 2.846 | 3.433 | 8.460 | 2055.900 | 2549.140 | 2138.400 | 2144.000 | 0.12 | 0.19 | 0.26 | 0.68 |
| Engines and turbines | 0.002 | 0.003 | 0.004 | 0.007 | 126.638 | 134.506 | 89.568 | 85.128 | 0.00 | 0.00 | 0.01 | 0.01 |
| Farm and garden machinery and ec | 0.254 | 0.481 | 0.587 | 0.905 | 109.066 | 169.226 | 106.800 | 96.331 | 0.39 | 0.49 | 0.88 | 1.63 |
| Construction and related machinery | 0.258 | 0.429 | 0.438 | 0.931 | 313.630 | 388.295 | 230.231 | 240.578 | 0.14 | 0.19 | 0.30 | 0.67 |
| Metalworking machinery and equipr | 0.214 | 0.308 | 0.416 | 0.907 | 396.914 | 404.512 | 337.331 | 331.008 | 0.09 | 0.13 | 0.20 | 0.47 |
| Special industry machinery | 0.031 | 0.054 | 0.049 | 0.192 | 217.225 | 199.669 | 164.508 | 174.857 | 0.02 | 0.05 | 0.05 | 0.19 |
| General industrial machinery and ec | 0.226 | 0.425 | 0.670 | 1.180 | 204.428 | 309.005 | 258.283 | 255.984 | 0.19 | 0.24 | 0.42 | 0.80 |
| Computer and office equipment | 0.303 | 0.872 | 0.818 | 3.234 | 321.844 | 419.932 | 439.422 | 363.419 | 0.16 | 0.36 | 0.30 | 1.54 |
| Refrigeration and service industry m | 0.090 | 0.113 | 0.217 | 0.442 | 179.918 | 183.453 | 185.747 | 216.571 | 0.08 | 0.11 | 0.19 | 0.35 |
| Industrial machinery, nec | 0.059 | 0.160 | 0.234 | 0.661 | 186.237 | 340.542 | 326.511 | 380.124 | 0.05 | 0.08 | 0.11 | 0.30 |
| Electric Equip | 0.272 | 0.958 | 1.571 | 2.333 | 1704.020 | 1829.690 | 1699.300 | 1742.700 | 0.03 | 0.09 | 0.15 | 0.23 |
| Electric distribution equipment | 0.007 | 0.013 | 0.011 | 0.024 | 148.836 | 123.111 | 101.418 | 86.260 | 0.01 | 0.02 | 0.02 | 0.05 |
| Electrical industrial apparatus | 0.134 | 0.316 | 0.257 | 0.528 | 238.500 | 239.536 | 171.482 | 152.700 | 0.09 | 0.23 | 0.24 | 0.60 |
| Household appliances | 0.013 | 0.023 | 0.017 | 0.042 | 205.967 | 166.513 | 125.109 | 117.508 | 0.01 | 0.02 | 0.02 | 0.06 |
| Electric lighting and wiring equipme | 0.019 | 0.082 | 0.159 | 0.189 | 224.557 | 217.321 | 191.242 | 185.869 | 0.01 | 0.06 | 0.13 | 0.18 |
| Household audio and video equipm | 0.000 | 0.000 | 0.000 | 0.000 | 150.423 | 113.031 | 86.800 | 80.496 | 0.00 | 0.00 | 0.00 | 0.00 |
| Communications equipment | 0.009 | 0.101 | 0.293 | 0.299 | 210.877 | 258.255 | 268.666 | 279.309 | 0.01 | 0.07 | 0.17 | 0.19 |
| Electronic components and access | 0.075 | 0.234 | 0.271 | 0.766 | 404.793 | 554.461 | 587.638 | 692.408 | 0.03 | 0.07 | 0.07 | 0.19 |
| Miscellaneous electrical equipment | 0.015 | 0.189 | 0.563 | 0.486 | 120.067 | 157.462 | 166.946 | 148.149 | 0.02 | 0.21 | 0.54 | 0.57 |

Hampton Roads Location Quotients Based on Employment

| | Hampton Roads | | | | U.S. | | | | Location Quotients | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 |
| Motor Vehicles | 1.105 | 2.444 | 2.658 | 3.359 | 814.300 | 798.900 | 825.700 | 1020.900 | 0.23 | 0.53 | 0.52 | 0.57 |
| Rest Trans Equip | 22.745 | 28.478 | 31.124 | 22.740 | 1206.050 | 1097.760 | 1183.800 | 844.600 | 3.18 | 4.47 | 4.21 | 4.66 |
| Aerospace | 0.001 | 0.004 | 0.006 | 0.003 | 441.975 | 746.004 | 894.615 | 554.247 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ship and boat building and repairing | 22.742 | 28.467 | 31.110 | 22.727 | 538.741 | 224.583 | 196.968 | 168.479 | 7.11 | 21.83 | 25.29 | 23.36 |
| Railroad equipment | 0.000 | 0.000 | 0.000 | 0.000 | 158.668 | 70.953 | 32.928 | 35.881 | 0.00 | 0.00 | 0.00 | 0.00 |
| Miscellaneous transportation equipr | 0.002 | 0.006 | 0.008 | 0.010 | 66.665 | 56.221 | 59.289 | 85.993 | 0.01 | 0.02 | 0.02 | 0.02 |
| Instruments | 0.607 | 0.806 | 2.640 | 1.247 | 621.860 | 978.227 | 991.600 | 845.900 | 0.16 | 0.14 | 0.43 | 0.26 |
| Search and navigation equipment | 0.109 | 0.337 | 0.796 | 0.357 | 108.499 | 284.334 | 279.576 | 152.740 | 0.17 | 0.20 | 0.46 | 0.40 |
| Measuring and controlling devices | 0.029 | 0.074 | 0.624 | 0.204 | 101.860 | 317.167 | 317.010 | 298.762 | 0.05 | 0.04 | 0.32 | 0.12 |
| Medical equipment, instruments and | 0.027 | 0.065 | 0.875 | 0.323 | 59.578 | 184.784 | 244.495 | 286.906 | 0.08 | 0.06 | 0.57 | 0.19 |
| Ophthalmic goods | 0.130 | 0.107 | 0.052 | 0.139 | 69.756 | 42.092 | 42.333 | 32.899 | 0.31 | 0.44 | 0.20 | 0.73 |
| Photographic equipment and suppli | 0.311 | 0.223 | 0.293 | 0.224 | 221.057 | 128.470 | 97.504 | 69.355 | 0.24 | 0.30 | 0.48 | 0.56 |
| Watches, clocks, and parts | 0.000 | 0.000 | 0.000 | 0.000 | 61.110 | 21.380 | 10.681 | 5.236 | 0.00 | 0.00 | 0.00 | 0.00 |
| Misc. Manufact | 1.262 | 0.882 | 0.636 | 1.605 | 465.200 | 499.200 | 445.700 | 489.500 | 0.46 | 0.30 | 0.23 | 0.57 |
| Jewelry, silverware, and plated ware | 0.194 | 0.084 | 0.040 | 0.090 | 93.755 | 72.704 | 71.558 | 70.445 | 0.35 | 0.20 | 0.09 | 0.22 |
| Toys and sporting goods | 0.538 | 0.223 | 0.135 | 0.318 | 201.320 | 138.810 | 117.909 | 123.364 | 0.45 | 0.28 | 0.18 | 0.45 |
| Manufactured products, nec | 0.529 | 0.575 | 0.461 | 1.196 | 170.125 | 287.686 | 256.233 | 295.690 | 0.52 | 0.34 | 0.29 | 0.70 |
| Food | 12.953 | 16.418 | 11.543 | 11.299 | 1799.600 | 1724.000 | 1677.200 | 1730.700 | 1.21 | 1.64 | 1.10 | 1.13 |
| Meat products | 7.939 | 7.893 | 5.534 | 6.312 | 484.989 | 361.598 | 424.614 | 518.486 | 2.76 | 3.76 | 2.09 | 2.11 |
| Dairy products | 0.482 | 0.428 | 0.376 | 0.267 | 348.930 | 179.109 | 158.669 | 149.334 | 0.23 | 0.41 | 0.38 | 0.31 |
| Preserved fruits and vegetables | 0.183 | 0.370 | 0.222 | 0.189 | 162.087 | 246.101 | 247.284 | 225.123 | 0.19 | 0.26 | 0.14 | 0.15 |
| Grain mill products and fats and oils | 0.439 | 0.966 | 0.481 | 0.437 | 115.522 | 190.937 | 159.367 | 154.740 | 0.64 | 0.87 | 0.48 | 0.49 |
| Bakery products | 0.758 | 1.393 | 0.808 | 0.718 | 176.089 | 237.553 | 217.347 | 212.678 | 0.72 | 1.01 | 0.60 | 0.58 |
| Sugar and confectionery products | 0.511 | 0.925 | 0.533 | 0.461 | 79.921 | 107.644 | 101.688 | 95.068 | 1.08 | 1.48 | 0.84 | 0.84 |
| Beverages | 1.683 | 2.179 | 1.862 | 1.414 | 330.808 | 232.882 | 185.812 | 192.073 | 0.86 | 1.61 | 1.60 | 1.27 |
| Miscellaneous food and kindred pro | 0.959 | 2.263 | 1.727 | 1.502 | 101.255 | 168.176 | 182.419 | 183.199 | 1.59 | 2.32 | 1.52 | 1.42 |
| Tobacco Manuf | 0.001 | 0.003 | 0.001 | 0.002 | 81.100 | 67.401 | 50.501 | 35.700 | 0.00 | 0.01 | 0.00 | 0.01 |
| Textiles | 0.608 | 0.702 | 0.518 | 0.393 | 986.800 | 857.100 | 704.101 | 542.201 | 0.10 | 0.14 | 0.12 | 0.13 |
| Weaving, finishing, yarn, and thread | 0.549 | 0.631 | 0.461 | 0.336 | 600.967 | 511.971 | 380.894 | 292.647 | 0.15 | 0.21 | 0.19 | 0.20 |
| Knitting mills | 0.000 | 0.000 | 0.000 | 0.000 | 257.154 | 225.769 | 208.336 | 128.975 | 0.00 | 0.00 | 0.00 | 0.00 |
| Carpets and rugs | 0.000 | 0.000 | 0.000 | 0.000 | 57.840 | 55.614 | 63.315 | 66.258 | 0.00 | 0.00 | 0.00 | 0.00 |
| Miscellaneous textile goods | 0.059 | 0.071 | 0.057 | 0.057 | 70.838 | 63.745 | 51.556 | 54.321 | 0.14 | 0.19 | 0.18 | 0.18 |
| Apparel | 1.448 | 1.427 | 1.419 | 0.859 | 1381.100 | 1291.600 | 1086.000 | 686.900 | 0.18 | 0.19 | 0.21 | 0.22 |
| Apparel | 0.777 | 0.732 | 0.657 | 0.184 | 1201.399 | 1104.705 | 865.948 | 452.171 | 0.11 | 0.11 | 0.12 | 0.07 |
| Miscellaneous fabricated textile pro | 0.671 | 0.695 | 0.762 | 0.676 | 179.701 | 186.895 | 220.052 | 234.729 | 0.63 | 0.64 | 0.55 | 0.50 |
| Paper | 0.826 | 0.961 | 1.090 | 1.290 | 702.190 | 686.129 | 698.200 | 661.500 | 0.20 | 0.24 | 0.25 | 0.34 |
| Pulp, paper, and paperboard mills | 0.183 | 0.299 | 0.376 | 0.445 | 195.309 | 260.743 | 246.441 | 199.706 | 0.16 | 0.20 | 0.24 | 0.39 |
| Paperboard containers and boxes | 0.200 | 0.175 | 0.182 | 0.229 | 273.580 | 205.328 | 209.320 | 219.797 | 0.12 | 0.15 | 0.14 | 0.18 |
| Converted paper products except c | 0.443 | 0.487 | 0.532 | 0.617 | 233.301 | 220.058 | 242.439 | 241.997 | 0.32 | 0.38 | 0.35 | 0.44 |
| Printing | 2.715 | 3.997 | 5.038 | 5.566 | 1148.000 | 1342.300 | 1700.900 | 1656.000 | 0.40 | 0.51 | 0.47 | 0.58 |
| Newspapers | 1.861 | 2.280 | 2.565 | 2.580 | 481.519 | 443.502 | 503.496 | 470.462 | 0.65 | 0.89 | 0.82 | 0.95 |
| Periodicals | 0.113 | 0.145 | 0.226 | 0.308 | 98.435 | 97.470 | 141.487 | 158.623 | 0.19 | 0.26 | 0.26 | 0.34 |
| Books | 0.080 | 0.085 | 0.114 | 0.146 | 133.445 | 109.364 | 135.079 | 139.139 | 0.10 | 0.13 | 0.14 | 0.18 |
| Miscellaneous publishing | 0.027 | 0.067 | 0.125 | 0.176 | 27.536 | 52.313 | 89.409 | 101.498 | 0.17 | 0.22 | 0.22 | 0.30 |
| Commercial printing and business f | 0.604 | 1.371 | 1.937 | 2.288 | 283.166 | 494.807 | 655.765 | 644.283 | 0.36 | 0.48 | 0.47 | 0.61 |
| Greeting cards | 0.000 | 0.000 | 0.000 | 0.000 | 15.964 | 26.812 | 27.667 | 27.032 | 0.00 | 0.00 | 0.00 | 0.00 |
| Blankbooks and bookbinding | 0.013 | 0.015 | 0.020 | 0.020 | 75.729 | 66.525 | 78.728 | 63.959 | 0.03 | 0.04 | 0.04 | 0.05 |
| Service industries for the printing tra | 0.017 | 0.034 | 0.051 | 0.046 | 32.206 | 51.507 | 69.269 | 51.004 | 0.09 | 0.11 | 0.12 | 0.16 |

Hampton Roads Location Quotients Based on Employment

| | Hampton Roads | | | | U.S. | | | | Location Quotients | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 |
| Chemicals | 3.436 | 2.364 | 1.746 | 1.107 | 1057.700 | 1122.200 | 1098.600 | 1055.700 | 0.55 | 0.36 | 0.25 | 0.18 |
| Industrial chemicals | 1.059 | 1.011 | 0.723 | 0.365 | 208.254 | 339.462 | 295.645 | 221.468 | 0.86 | 0.51 | 0.39 | 0.29 |
| Plastics materials and synthetics | 1.092 | 0.394 | 0.295 | 0.215 | 298.336 | 206.419 | 184.577 | 157.452 | 0.62 | 0.33 | 0.26 | 0.24 |
| Drugs | 0.084 | 0.045 | 0.046 | 0.052 | 191.063 | 197.650 | 238.752 | 319.672 | 0.07 | 0.04 | 0.03 | 0.03 |
| Soap, cleaners, and toilet goods | 0.101 | 0.047 | 0.044 | 0.037 | 162.962 | 146.045 | 161.316 | 158.162 | 0.10 | 0.06 | 0.04 | 0.04 |
| Paints and allied products | 0.264 | 0.127 | 0.096 | 0.041 | 89.693 | 65.615 | 61.526 | 52.450 | 0.50 | 0.33 | 0.25 | 0.14 |
| Agricultural chemicals | 0.461 | 0.459 | 0.293 | 0.196 | 41.372 | 72.569 | 56.189 | 51.842 | 1.88 | 1.09 | 0.84 | 0.65 |
| Miscellaneous chemical products | 0.375 | 0.280 | 0.250 | 0.201 | 66.019 | 94.441 | 100.596 | 94.654 | 0.96 | 0.51 | 0.40 | 0.37 |
| Petro Products | 0.274 | 0.311 | 0.384 | 0.423 | 189.200 | 198.700 | 156.700 | 126.900 | 0.24 | 0.27 | 0.39 | 0.58 |
| Petroleum refining | 0.264 | 0.302 | 0.364 | 0.419 | 146.596 | 155.347 | 117.525 | 84.202 | 0.30 | 0.33 | 0.50 | 0.86 |
| Miscellaneous petroleum and coal p | 0.010 | 0.009 | 0.020 | 0.003 | 42.604 | 43.353 | 39.175 | 42.698 | 0.04 | 0.04 | 0.08 | 0.01 |
| Rubber | 1.424 | 1.429 | 1.972 | 1.712 | 604.508 | 754.669 | 892.800 | 1016.200 | 0.40 | 0.33 | 0.35 | 0.29 |
| Tires and inner tubes | 0.019 | 0.012 | 0.012 | 0.014 | 124.862 | 112.558 | 84.618 | 79.449 | 0.03 | 0.02 | 0.02 | 0.03 |
| Rubber products and plastic hose a | 0.866 | 0.870 | 1.015 | 0.815 | 141.843 | 187.466 | 177.257 | 189.053 | 1.03 | 0.80 | 0.92 | 0.75 |
| Miscellaneous plastics products, ne | 0.539 | 0.548 | 0.944 | 0.883 | 337.804 | 454.645 | 630.925 | 747.698 | 0.27 | 0.21 | 0.24 | 0.20 |
| Leather | 0.003 | 0.005 | 0.000 | 0.000 | 322.300 | 244.501 | 138.500 | 73.401 | 0.00 | 0.00 | 0.00 | 0.00 |
| Footwear, except rubber and plastic | 0.002 | 0.003 | 0.000 | 0.000 | 215.986 | 157.888 | 81.827 | 29.551 | 0.00 | 0.00 | 0.00 | 0.00 |
| Luggage, handbags, and leather pr | 0.001 | 0.002 | 0.000 | 0.000 | 106.314 | 86.613 | 56.673 | 43.850 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mining | 0.152 | 0.169 | 0.439 | 0.361 | 743.905 | 1277.600 | 1044.100 | 795.403 | 0.03 | 0.02 | 0.07 | 0.08 |
| Metal mining | 0.034 | 0.027 | 0.074 | 0.030 | 108.958 | 120.085 | 83.608 | 60.670 | 0.05 | 0.04 | 0.14 | 0.09 |
| Coal mining | 0.013 | 0.023 | 0.039 | 0.023 | 170.736 | 299.366 | 209.730 | 109.946 | 0.01 | 0.01 | 0.03 | 0.04 |
| Crude petroleum, natural gas and gas li | 0.009 | 0.014 | 0.036 | 0.026 | 175.875 | 282.660 | 294.760 | 191.837 | 0.01 | 0.01 | 0.02 | 0.02 |
| Oil and gas field services | 0.000 | 0.000 | 0.000 | 0.000 | 151.934 | 417.756 | 297.603 | 269.739 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nonmetallic minerals, except fuels | 0.097 | 0.105 | 0.291 | 0.282 | 136.402 | 157.733 | 158.399 | 163.211 | 0.12 | 0.11 | 0.29 | 0.30 |
| Construction | 27.902 | 35.651 | 49.030 | 56.528 | 4398.800 | 5654.200 | 7260.800 | 9604.300 | 1.07 | 1.09 | 1.08 | 1.02 |
| Trans.&Public Util. | 22.764 | 26.266 | 33.057 | 39.477 | 4865.501 | 5672.102 | 6568.600 | 8250.101 | 0.79 | 0.80 | 0.81 | 0.83 |
| Railroad | 3.445 | 2.515 | 1.617 | 1.217 | 626.000 | 519.000 | 260.000 | 212.999 | 0.93 | 0.83 | 1.00 | 0.99 |
| Trucking | 4.143 | 5.917 | 7.704 | 10.032 | 1323.200 | 1658.400 | 1884.700 | 2604.900 | 0.53 | 0.61 | 0.65 | 0.67 |
| Local&Interurban | 2.997 | 2.437 | 2.367 | 2.890 | 340.800 | 323.600 | 438.400 | 649.100 | 1.48 | 1.30 | 0.86 | 0.77 |
| Air Transportation | 0.606 | 1.076 | 2.892 | 4.319 | 359.500 | 467.600 | 979.500 | 1326.000 | 0.28 | 0.40 | 0.47 | 0.56 |
| Other Transport | 5.076 | 6.046 | 7.070 | 9.779 | 371.014 | 473.156 | 655.900 | 817.802 | 2.30 | 2.20 | 1.73 | 2.07 |
| Water transportation | 4.714 | 5.157 | 5.288 | 6.742 | 244.885 | 227.603 | 216.149 | 236.630 | 3.24 | 3.90 | 3.92 | 4.93 |
| Pipelines, except natural gas | 0.011 | 0.014 | 0.014 | 0.011 | 19.935 | 22.622 | 21.545 | 15.661 | 0.09 | 0.11 | 0.10 | 0.12 |
| Passenger transportation arrangem | 0.144 | 0.410 | 0.931 | 1.469 | 48.531 | 112.368 | 234.200 | 267.266 | 0.50 | 0.63 | 0.64 | 0.95 |
| Miscellaneous transportation servic | 0.207 | 0.466 | 0.837 | 1.557 | 57.663 | 110.562 | 184.006 | 298.245 | 0.60 | 0.73 | 0.73 | 0.90 |
| Communication | 4.275 | 5.583 | 6.898 | 8.498 | 1126.200 | 1363.800 | 1353.500 | 1760.700 | 0.64 | 0.71 | 0.82 | 0.84 |
| Public Utilities | 2.222 | 2.692 | 4.508 | 2.741 | 718.787 | 866.546 | 996.600 | 878.600 | 0.52 | 0.54 | 0.72 | 0.54 |
| Electric utilities | 1.420 | 1.752 | 2.779 | 1.435 | 492.193 | 607.575 | 669.976 | 522.896 | 0.49 | 0.50 | 0.66 | 0.48 |
| Gas utilities | 0.549 | 0.578 | 0.799 | 0.409 | 166.474 | 173.681 | 171.108 | 131.211 | 0.56 | 0.57 | 0.75 | 0.54 |
| Water and sanitation | 0.254 | 0.363 | 0.930 | 0.897 | 60.119 | 85.290 | 155.515 | 224.494 | 0.71 | 0.73 | 0.96 | 0.69 |

Hampton Roads Location Quotients Based on Employment

| | Hampton Roads | | | | U.S. | | | | Location Quotients | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 |
| Fin&Ins&Real Est | 24.534 | 39.884 | 50.130 | 63.718 | 6115.318 | 8736.675 | 10712.600 | 13500.100 | 0.68 | 0.79 | 0.75 | 0.82 |
| Banking | 5.095 | 8.470 | 11.891 | 15.065 | 1459.990 | 2187.250 | 2650.600 | 2836.800 | 0.59 | 0.67 | 0.72 | 0.92 |
| Insurance | 3.236 | 4.899 | 5.661 | 10.413 | 1616.878 | 2094.935 | 2662.200 | 2993.400 | 0.34 | 0.40 | 0.34 | 0.60 |
| Insurance carriers | 2.197 | 3.071 | 3.336 | 6.213 | 1170.471 | 1422.065 | 1690.051 | 1906.057 | 0.32 | 0.37 | 0.32 | 0.56 |
| Insurance agents, brokers, and serv | 1.039 | 1.828 | 2.325 | 4.200 | 446.407 | 672.870 | 972.149 | 1087.342 | 0.39 | 0.47 | 0.38 | 0.67 |
| Credit & Finance | 3.906 | 6.053 | 5.633 | 8.077 | 957.200 | 1448.400 | 1501.100 | 3108.900 | 0.69 | 0.72 | 0.60 | 0.45 |
| Nondepository; holding and investm | 2.692 | 4.052 | 3.666 | 4.933 | 573.125 | 824.228 | 833.364 | 1623.159 | 0.79 | 0.85 | 0.70 | 0.53 |
| Security and commodity brokers | 1.214 | 2.001 | 1.967 | 3.144 | 384.075 | 624.172 | 667.736 | 1485.741 | 0.53 | 0.55 | 0.47 | 0.37 |
| Real Estate | 12.297 | 20.462 | 26.945 | 30.163 | 2081.250 | 3006.090 | 3898.700 | 4561.000 | 0.99 | 1.17 | 1.11 | 1.15 |
| Retail Trade | 67.074 | 90.358 | 138.464 | 160.197 | 13699.160 | 17878.551 | 22920.500 | 27350.100 | 0.82 | 0.87 | 0.97 | 1.01 |
| Eating & Drinking | 12.596 | 24.332 | 43.342 | 53.663 | 2998.000 | 5024.200 | 7050.800 | 8766.400 | 0.71 | 0.83 | 0.98 | 1.06 |
| Rest of Retail | 54.478 | 66.026 | 95.122 | 106.534 | 10701.160 | 12854.351 | 15869.700 | 18583.699 | 0.86 | 0.88 | 0.96 | 0.99 |
| Wholesale Trade | 15.270 | 22.574 | 28.711 | 31.239 | 4172.340 | 5747.050 | 6711.500 | 7588.900 | 0.62 | 0.68 | 0.69 | 0.71 |
| Services | 82.748 | 124.452 | 202.185 | 272.418 | 17039.879 | 25018.926 | 38709.598 | 53301.695 | 0.82 | 0.86 | 0.84 | 0.89 |
| Hotels | 6.744 | 11.252 | 13.377 | 14.675 | 986.500 | 1251.000 | 1819.500 | 2113.400 | 1.15 | 1.55 | 1.18 | 1.20 |
| Pers Serv & Rep | 11.990 | 14.369 | 20.127 | 22.903 | 2011.690 | 2349.030 | 3183.000 | 3743.300 | 1.00 | 1.05 | 1.01 | 1.06 |
| Laundry, cleaning, and shoe repair | 2.195 | 3.264 | 4.080 | 4.254 | 442.427 | 631.323 | 764.221 | 821.857 | 0.84 | 0.89 | 0.85 | 0.90 |
| Personal services, nec | 0.493 | 1.075 | 2.421 | 3.556 | 92.920 | 194.056 | 418.024 | 632.892 | 0.89 | 0.95 | 0.93 | 0.97 |
| Beauty and barber shops | 5.340 | 5.389 | 7.218 | 8.743 | 824.554 | 797.859 | 1031.072 | 1287.836 | 1.09 | 1.16 | 1.12 | 1.18 |
| Funeral service and crematories | 0.513 | 0.510 | 0.729 | 0.851 | 103.928 | 99.076 | 135.722 | 163.391 | 0.83 | 0.89 | 0.86 | 0.90 |
| Electrical repair shops | 1.006 | 1.210 | 1.656 | 1.486 | 132.299 | 153.223 | 208.107 | 192.793 | 1.28 | 1.36 | 1.27 | 1.33 |
| Watch, jewelry, & furniture repair | 0.474 | 0.475 | 0.505 | 0.521 | 92.878 | 89.348 | 91.734 | 97.545 | 0.86 | 0.92 | 0.88 | 0.92 |
| Miscellaneous repair services | 1.970 | 2.445 | 3.518 | 3.493 | 322.684 | 384.145 | 534.119 | 546.986 | 1.03 | 1.10 | 1.05 | 1.11 |
| Private Household | 17.364 | 13.098 | 8.189 | 7.015 | 2280.000 | 1598.000 | 1332.000 | 1208.000 | 1.28 | 1.41 | 0.98 | 1.01 |
| Auto Rep&Serv | 2.656 | 4.092 | 7.750 | 9.181 | 590.600 | 913.500 | 1456.500 | 1788.600 | 0.76 | 0.77 | 0.85 | 0.89 |
| Automotive rentals, without drivers | 0.444 | 0.843 | 1.573 | 1.732 | 85.619 | 161.960 | 254.791 | 266.056 | 0.87 | 0.90 | 0.99 | 1.13 |
| Automobile parking, repair, and serv | 2.212 | 3.249 | 6.177 | 7.449 | 504.981 | 751.540 | 1201.709 | 1522.544 | 0.74 | 0.74 | 0.82 | 0.85 |
| Misc. Bus Serv | 5.827 | 16.047 | 38.136 | 63.291 | 1768.780 | 3609.890 | 7457.500 | 12283.600 | 0.55 | 0.77 | 0.82 | 0.89 |
| Advertising | 0.907 | 1.026 | 1.845 | 1.977 | 278.964 | 222.527 | 344.140 | 380.500 | 0.55 | 0.79 | 0.86 | 0.90 |
| Services to buildings | 2.333 | 3.531 | 7.715 | 7.911 | 671.232 | 735.740 | 1368.664 | 1356.081 | 0.59 | 0.83 | 0.90 | 1.01 |
| Miscellaneous equipment rental and | 0.099 | 0.508 | 1.315 | 1.626 | 37.347 | 139.176 | 307.090 | 367.933 | 0.45 | 0.63 | 0.69 | 0.77 |
| Personnel supply services | 0.747 | 2.971 | 9.770 | 23.338 | 247.158 | 718.602 | 2004.361 | 4517.581 | 0.51 | 0.71 | 0.78 | 0.89 |
| Computer and data processing serv | 0.278 | 1.323 | 4.038 | 10.039 | 120.450 | 414.933 | 1079.017 | 2604.585 | 0.39 | 0.55 | 0.60 | 0.67 |
| Miscellaneous business services | 1.464 | 6.689 | 13.453 | 18.400 | 413.629 | 1378.911 | 2354.229 | 3056.919 | 0.60 | 0.84 | 0.92 | 1.04 |
| Amusem & Recr | 3.040 | 6.238 | 10.977 | 14.487 | 714.576 | 1230.590 | 1858.400 | 3272.500 | 0.72 | 0.87 | 0.95 | 0.77 |
| Producers, orchestras, and entertai | 1.192 | 0.901 | 1.838 | 2.843 | 250.389 | 196.857 | 360.629 | 520.246 | 0.80 | 0.79 | 0.82 | 0.95 |
| Bowling centers | 0.336 | 0.877 | 0.951 | 0.734 | 58.400 | 155.160 | 145.079 | 136.687 | 0.97 | 0.97 | 1.05 | 0.93 |
| Commercial sports | 0.085 | 0.056 | 0.093 | 0.168 | 157.796 | 107.049 | 160.739 | 272.042 | 0.09 | 0.09 | 0.09 | 0.11 |
| Amusement and recreation services | 1.426 | 4.405 | 8.095 | 10.743 | 247.990 | 771.524 | 1191.953 | 2343.525 | 0.97 | 0.98 | 1.09 | 0.79 |
| Motion Pictures | 1.359 | 1.373 | 1.853 | 3.069 | 289.681 | 325.297 | 488.200 | 698.700 | 0.79 | 0.73 | 0.61 | 0.76 |
| Motion pictures | 1.035 | 0.913 | 0.878 | 1.663 | 253.191 | 264.812 | 320.171 | 505.330 | 0.69 | 0.59 | 0.44 | 0.57 |
| Video tape rental | 0.324 | 0.460 | 0.975 | 1.406 | 36.490 | 60.485 | 168.029 | 193.370 | 1.50 | 1.31 | 0.93 | 1.26 |

Hampton Roads Location Quotients Based on Employment

| | Hampton Roads | | | | U.S. | | | | Location Quotients | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 | 1970 | 1980 | 1990 | 2000 |
| Medical | 15.952 | 30.132 | 48.247 | 55.735 | 3283.100 | 5887.900 | 8964.000 | 11492.700 | 0.82 | 0.88 | 0.86 | 0.84 |
| Offices of health practitioners | 3.688 | 9.232 | 16.001 | 19.498 | 680.670 | 1629.915 | 2714.650 | 3680.709 | 0.91 | 0.98 | 0.94 | 0.92 |
| Nursing and personal care facilities | 2.262 | 4.295 | 6.666 | 7.693 | 578.939 | 1049.876 | 1547.962 | 1981.844 | 0.66 | 0.70 | 0.69 | 0.67 |
| Hospitals | 9.389 | 14.833 | 21.124 | 21.594 | 1899.943 | 2866.164 | 3871.212 | 4387.610 | 0.83 | 0.89 | 0.87 | 0.85 |
| Health services, nec | 0.613 | 1.772 | 4.456 | 6.950 | 123.548 | 341.946 | 830.176 | 1442.537 | 0.84 | 0.89 | 0.86 | 0.83 |
| Misc. Prof Serv | 6.490 | 13.138 | 28.097 | 41.485 | 1948.693 | 3546.664 | 6012.600 | 7911.900 | 0.56 | 0.64 | 0.75 | 0.91 |
| Legal services | 1.774 | 2.762 | 5.995 | 7.586 | 699.001 | 920.621 | 1584.514 | 1776.280 | 0.43 | 0.52 | 0.61 | 0.74 |
| Engineering and architectural servic | 2.771 | 4.302 | 8.394 | 12.335 | 610.375 | 812.637 | 1245.657 | 1627.491 | 0.76 | 0.91 | 1.08 | 1.31 |
| Research and testing services | 0.882 | 2.357 | 5.010 | 6.928 | 202.302 | 496.485 | 790.903 | 990.395 | 0.73 | 0.82 | 1.01 | 1.21 |
| Management and public relations | 0.484 | 1.490 | 4.320 | 8.727 | 180.041 | 480.885 | 1087.135 | 1958.710 | 0.45 | 0.53 | 0.64 | 0.77 |
| Accounting, auditing, and other serv | 0.578 | 2.228 | 4.377 | 5.909 | 256.974 | 836.036 | 1304.391 | 1559.024 | 0.38 | 0.46 | 0.54 | 0.66 |
| Education | 3.535 | 6.128 | 9.257 | 13.932 | 1054.130 | 1561.100 | 2229.900 | 3100.000 | 0.56 | 0.68 | 0.66 | 0.78 |
| Non-Profit Org | 7.791 | 8.586 | 16.176 | 26.646 | 2112.128 | 2745.954 | 3908.000 | 5689.000 | 0.62 | 0.54 | 0.66 | 0.81 |
| Individual and miscellaneous social | 0.516 | 0.887 | 1.796 | 3.379 | 195.276 | 391.108 | 589.510 | 972.784 | 0.44 | 0.39 | 0.49 | 0.60 |
| Job training and related services | 0.356 | 0.649 | 1.101 | 1.983 | 82.724 | 177.106 | 227.505 | 359.667 | 0.72 | 0.63 | 0.77 | 0.95 |
| Child day care services | 1.575 | 1.879 | 3.652 | 6.395 | 365.348 | 508.905 | 737.452 | 1132.962 | 0.73 | 0.64 | 0.79 | 0.98 |
| Residential care | 0.308 | 0.471 | 1.410 | 2.547 | 110.646 | 203.070 | 491.364 | 781.421 | 0.47 | 0.40 | 0.46 | 0.56 |
| Museums, botanical, zoological gar | 0.189 | 0.248 | 0.722 | 1.183 | 26.316 | 38.081 | 72.257 | 103.383 | 1.21 | 1.12 | 1.60 | 1.98 |
| Membership organizations | 4.847 | 4.452 | 7.493 | 11.159 | 1331.818 | 1427.685 | 1789.911 | 2338.783 | 0.61 | 0.54 | 0.67 | 0.83 |
| Agri&For&Fish Serv | 2.224 | 3.784 | 6.145 | 9.149 | 525.300 | 909.000 | 1453.000 | 2166.800 | 0.71 | 0.72 | 0.68 | 0.73 |
| Agricultural services | 2.080 | 3.526 | 5.849 | 8.860 | 463.631 | 797.888 | 1318.417 | 2030.981 | 0.76 | 0.76 | 0.71 | 0.76 |
| Forestry, fishing, hunting, & trapping | 0.144 | 0.258 | 0.296 | 0.289 | 61.669 | 111.112 | 134.583 | 135.819 | 0.39 | 0.40 | 0.35 | 0.37 |
| Government | 232.125 | 242.689 | 284.286 | 259.580 | 16073.000 | 18758.000 | 21196.000 | 22740.000 | 2.43 | 2.23 | 2.15 | 1.98 |
| State and Local | 47.475 | 68.481 | 81.909 | 101.525 | 9939.000 | 13263.000 | 15245.000 | 17774.000 | 0.80 | 0.89 | 0.86 | 0.99 |
| State | 0.000 | 16.885 | 19.732 | 22.792 | 0.000 | 3746.000 | 4404.000 | 4952.000 | | 0.78 | 0.72 | 0.80 |
| Local | 0.000 | 51.596 | 62.177 | 78.733 | 0.000 | 9517.000 | 10841.000 | 12822.000 | | 0.93 | 0.92 | 1.06 |
| Federal Civilian | 53.461 | 54.310 | 59.698 | 46.790 | 2902.000 | 2994.000 | 3233.000 | 2891.000 | 3.10 | 3.12 | 2.96 | 2.80 |
| Federal Military | 131.189 | 119.898 | 142.679 | 111.265 | 3232.000 | 2501.000 | 2718.000 | 2075.000 | 6.84 | 8.26 | 8.41 | 9.29 |
| Farm | 8.719 | 5.037 | 3.019 | 2.547 | 3961.000 | 3798.000 | 3153.000 | 3103.000 | 0.37 | 0.23 | 0.15 | 0.14 |
| Total | 542.080 | 663.146 | 870.687 | 967.295 | 91281.594 | 114231.219 | 139426.906 | 167511.297 | 1.00 | 1.00 | 1.00 | 1.00 |

# Appendix B -2

## High Tech Occupations

Location Quotients

| | Hampton Roads | Raleigh | Charlotte | Richmond | Atlanta | U.S. |
|---|---|---|---|---|---|---|
| Total All Occupations | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| High Tech Occupations | 1.08 | 1.89 | 0.93 | 1.05 | 1.19 | 1.00 |
| Computer and Mathematical Occupations | 1.12 | 2.14 | 1.01 | 1.28 | 1.47 | 1.00 |
| Computer and Information Scientists, Research | 1.37 | - | - | - | 1.44 | 1.00 |
| Computer Programmers | 1.18 | 2.72 | 0.92 | 2.03 | 1.16 | 1.00 |
| Computer Software Engineers, Applications | 1.23 | 2.88 | 0.58 | 0.88 | 1.42 | 1.00 |
| Computer Software Engineers, Systems Software | 0.88 | 0.00 | 1.08 | 1.04 | 1.34 | 1.00 |
| Computer Support Specialists | 0.84 | 1.94 | 1.48 | 0.76 | 1.70 | 1.00 |
| Computer Systems Analysts | 1.37 | 2.13 | 0.84 | 1.55 | 1.47 | 1.00 |
| Database Administrators | 1.50 | 1.65 | 0.97 | 0.84 | 1.54 | 1.00 |
| Network and Computer Systems Administrators | 0.99 | 2.89 | 0.95 | 1.47 | 1.59 | 1.00 |
| Network Systems/Data Communications Analysts | 1.07 | 2.64 | 1.91 | 1.28 | 1.47 | 1.00 |
| Mathematicians | - | - | - | - | - | 1.00 |
| Operations Research Analysts | 1.57 | 1.11 | 0.55 | 1.03 | 2.56 | 1.00 |
| Statisticians | 0.65 | 4.88 | 0.00 | 2.79 | 0.91 | 1.00 |
| Mathematical Technicians | - | - | - | - | 4.84 | 1.00 |
| Engineering Occupations | 1.22 | 1.24 | 0.88 | 0.71 | 0.98 | 1.00 |
| Aerospace Engineers | 2.08 | - | - | - | - | 1.00 |
| Agricultural Engineers | - | - | - | - | - | 1.00 |
| Biomedical Engineers | - | 1.95 | - | - | 0.34 | 1.00 |
| Chemical Engineers | 0.41 | 1.83 | 1.05 | - | 0.73 | 1.00 |
| Civil Engineers | 1.09 | 1.32 | 0.69 | 1.48 | 0.98 | 1.00 |
| Computer Hardware Engineers | 0.82 | 2.72 | 0.21 | 0.14 | 1.42 | 1.00 |
| Electrical Engineers | 1.11 | 2.23 | 0.83 | 1.04 | 0.91 | 1.00 |
| Electronics Engineers, Except Computer | 1.11 | 1.29 | 0.64 | - | 1.50 | 1.00 |
| Environmental Engineers | 1.02 | 2.50 | 0.46 | 1.56 | 1.26 | 1.00 |
| Health and Safety Engineers, Except Mining | - | 0.64 | 0.83 | 1.31 | 0.59 | 1.00 |
| Industrial Engineers | 0.78 | 1.11 | 0.70 | 0.87 | 1.68 | 1.00 |
| Marine Engineers and Naval Architects | 10.61 | - | - | - | - | 1.00 |
| Materials Engineers | 0.88 | 0.93 | 1.24 | 0.00 | 0.49 | 1.00 |
| Mechanical Engineers | 2.01 | 0.69 | 0.88 | 0.66 | 0.66 | 1.00 |
| Mining and Geological Engineers | - | - | - | - | - | 1.00 |
| Nuclear Engineers | 4.55 | - | - | - | 2.01 | 1.00 |
| Petroleum Engineers | - | - | - | - | - | 1.00 |
| Electrical and Electronics Drafters | - | 0.89 | 1.90 | 0.00 | 0.54 | 1.00 |
| Mechanical Drafters | - | 0.48 | 1.01 | 1.00 | 0.62 | 1.00 |
| Aerospace Engineering and Operations Technicians | 0.83 | - | - | - | - | 1.00 |
| Civil Engineering Technicians | 0.60 | 1.82 | 1.11 | 0.91 | 0.73 | 1.00 |
| Electrical and Electronic Engineering Technicians | 1.90 | 1.65 | 1.52 | 0.53 | 1.65 | 1.00 |
| Electro-Mechanical Technicians | - | 1.15 | 1.24 | 0.56 | - | 1.00 |
| Environmental Engineering Technicians | - | 0.54 | 1.68 | 1.19 | - | 1.00 |
| Industrial Engineering Technicians | 0.53 | - | 0.88 | 0.68 | 0.63 | 1.00 |
| Mechanical Engineering Technicians | 3.45 | 0.82 | 1.72 | 0.70 | 0.72 | 1.00 |
| Life & Physical Science Occupations | 0.35 | 2.89 | 0.64 | 1.08 | 0.49 | 1.00 |
| Agricultural and Food Scientists | - | 4.45 | 0.59 | 0.71 | 0.26 | 1.00 |
| Biochemists and Biophysicists | - | 2.64 | - | - | - | 1.00 |
| Microbiologists | - | 3.49 | - | - | 1.65 | 1.00 |
| Zoologists and Wildlife Biologists | 1.28 | 0.45 | - | - | 0.46 | 1.00 |
| Conservation Scientists | - | - | - | - | 0.14 | 1.00 |
| Epidemiologists | - | 2.44 | - | 7.79 | 1.35 | 1.00 |
| Medical Scientists, Except Epidemiologists | - | 5.46 | - | - | 0.29 | 1.00 |
| Astronomers | - | - | - | - | - | 1.00 |
| Physicists | 3.05 | 0.89 | - | - | 0.22 | 1.00 |
| Atmospheric and Space Scientists | 1.63 | 1.71 | 0.00 | 0.00 | 1.23 | 1.00 |
| Chemists | 0.30 | 5.72 | 1.06 | 2.92 | 0.56 | 1.00 |
| Materials Scientists | - | 0.93 | - | - | 1.56 | 1.00 |
| Environmental Scientists, Including Health | 1.41 | 3.23 | 0.99 | 1.20 | 0.68 | 1.00 |
| Geoscientists, Except Hydrologists and Geographers | 0.24 | - | 0.21 | 0.52 | 0.39 | 1.00 |
| Hydrologists | - | 2.11 | 0.00 | - | 0.65 | 1.00 |
| Agricultural and Food Science Technicians | - | 4.47 | 0.27 | - | 0.41 | 1.00 |
| Biological Technicians | - | 2.31 | 0.25 | 0.38 | 0.23 | 1.00 |
| Chemical Technicians | - | 1.58 | 1.65 | 1.91 | 0.61 | 1.00 |
| Geological and Petroleum Technicians | - | - | - | - | - | 1.00 |
| Nuclear Technicians | - | - | - | - | - | 1.00 |
| Environmental Science and Protection Technicians | - | - | 0.98 | 0.55 | - | 1.00 |

# Appendix B – 3

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| All Occupations | | 127,980,410 | 694,860 | 1.000 |
| Loan Counselors | | 29,710 | ** | NA |
| Health and Safety Engineers, Except Mining Safety Engineers and Inspectors | | 36,420 | ** | NA |
| Electro-Mechanical Technicians | | 42,130 | ** | NA |
| Environmental Engineering Technicians | | 17,970 | ** | NA |
| Microbiologists | | 15,520 | ** | NA |
| Conservation Scientists | | 12,750 | ** | NA |
| Materials Scientists | | 8,360 | ** | NA |
| Anthropologists and Archeologists | | 4,190 | ** | NA |
| Marriage and Family Therapists | | 20,380 | ** | NA |
| Court Reporters | | 15,300 | ** | NA |
| Environmental Science Teachers, Postsecondary | | 3,630 | ** | NA |
| Vocational Education Teachers, Postsecondary | | 116,890 | ** | NA |
| Farm and Home Management Advisors | | 12,540 | ** | NA |
| Multi-Media Artists and Animators | | 30,530 | ** | NA |
| Set and Exhibit Designers | | 7,840 | ** | NA |
| Coaches and Scouts | | 68,670 | ** | NA |
| Dancers | | 17,010 | ** | NA |
| Chiropractors | | 18,060 | Present | NA |
| Dentists | | 87,810 | Present | NA |
| Anesthesiologists | | 24,700 | Present | NA |
| Obstetricians and Gynecologists | | 17,230 | Present | NA |
| Pediatricians, General | | 24,150 | Present | NA |
| Psychiatrists | | 21,620 | ** | NA |
| Podiatrists | | 7,620 | Present | NA |
| Athletic Trainers | | 12,580 | ** | NA |
| Massage Therapists | | 26,440 | ** | NA |
| Bailiffs | | 16,330 | ** | NA |
| Crossing Guards | | 69,990 | ** | NA |
| Pesticide Handlers, Sprayers, and Applicators, Vegetation | | 22,120 | ** | NA |
| Tree Trimmers and Pruners | | 44,850 | ** | NA |
| Amusement and Recreation Attendants | | 211,950 | ** | NA |
| Barbers | | 12,290 | ** | NA |
| Travel Guides | | 5,480 | ** | NA |
| Sales Engineers | | 82,850 | ** | NA |
| Statistical Assistants | | 25,850 | ** | NA |
| Agricultural Inspectors | | 13,980 | ** | NA |
| Farmworkers, Farm and Ranch Animals | | 34,590 | ** | NA |
| Pile-Driver Operators | | 4,950 | ** | NA |
| Farm Equipment Mechanics | | 35,420 | ** | NA |
| Outdoor Power Equipment and Other Small Engine Mechanics | | 27,250 | ** | NA |
| Butchers and Meat Cutters | | 135,630 | ** | NA |
| Slaughterers and Meat Packers | | 117,490 | ** | NA |
| Food Batchmakers | | 70,540 | ** | NA |
| Food Cooking Machine Operators and Tenders | | 34,910 | ** | NA |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Metal-Refining Furnace Operators and Tenders | | 19,060 | ** | NA |
| Tool Grinders, Filers, and Sharpeners | | 25,410 | ** | NA |
| Tailors, Dressmakers, and Custom Sewers | | 31,580 | ** | NA |
| Chemical Plant and System Operators | | 60,340 | ** | NA |
| Petroleum Pump System Operators, Refinery Operators, and Gaugers | | 34,540 | ** | NA |
| Chemical Equipment Operators and Tenders | | 53,920 | ** | NA |
| Cutters and Trimmers, Hand | | 31,440 | ** | NA |
| Jewelers and Precious Stone and Metal Workers | | 29,030 | ** | NA |
| Airline Pilots, Copilots, and Flight Engineers | | 88,800 | ** | NA |
| Driver/Sales Workers | | 378,220 | ** | NA |
| Parking Lot Attendants | | 109,930 | ** | NA |
| Transportation Inspectors | | 27,670 | ** | NA |
| Ship Engineers | | 7,470 | 950 | 23.423 |
| Riggers | | 15,340 | 1,020 | 12.247 |
| Sailors and Marine Oilers | | 28,650 | 1,860 | 11.957 |
| Captains, Mates, and Pilots of Water Vessels | | 22,180 | 1,350 | 11.210 |
| Marine Engineers and Naval Architects | | 4,860 | 280 | 10.611 |
| Nuclear Engineers | | 14,180 | 350 | 4.546 |
| Desktop Publishers | | 34,860 | 710 | 3.751 |
| Crane and Tower Operators | | 51,650 | 1,050 | 3.744 |
| Archivists, Curators, and Museum Technicians | | 19,970 | 380 | 3.505 |
| Mechanical Engineering Technicians | | 54,430 | 1,020 | 3.452 |
| Shampooers | | 15,230 | 270 | 3.265 |
| Motorboat Operators | | 3,410 | 60 | 3.241 |
| Tax Preparers | | 59,520 | 1,040 | 3.218 |
| Audio and Video Equipment Technicians | | 32,960 | 560 | 3.129 |
| Radio Mechanics | | 6,550 | 110 | 3.093 |
| Physicists | | 10,880 | 180 | 3.047 |
| Motorboat Mechanics | | 18,370 | 290 | 2.908 |
| Helpers--Roofers | | 24,200 | 380 | 2.892 |
| Insulation Workers | | 54,270 | 850 | 2.885 |
| Avionics Technicians | | 16,340 | 250 | 2.818 |
| Motorcycle Mechanics | | 13,290 | 190 | 2.633 |
| Fence Erectors | | 20,550 | 290 | 2.599 |
| Camera Operators, Television, Video, and Motion Picture | | 22,040 | 310 | 2.591 |
| Appraisers and Assessors of Real Estate | | 59,630 | 810 | 2.502 |
| Transportation Attendants, Except Flight Attendants and Baggage Porters | | 25,910 | 340 | 2.417 |
| Plumbers, Pipefitters, and Steamfitters | | 438,290 | 5,690 | 2.391 |
| Sheet Metal Workers | | 207,960 | 2,590 | 2.294 |
| Broadcast Technicians | | 31,100 | 380 | 2.250 |
| Fish and Game Wardens | | 7,790 | 90 | 2.128 |
| Aerospace Engineers | | 74,380 | 840 | 2.080 |
| Real Estate Sales Agents | | 118,780 | 1,340 | 2.078 |
| Embalmers | | 7,980 | 90 | 2.077 |
| Physics Teachers, Postsecondary | | 11,830 | 130 | 2.024 |
| Painters, Construction and Maintenance | | 256,220 | 2,810 | 2.020 |
| Mechanical Engineers | | 204,310 | 2,230 | 2.010 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Watch Repairers | | 3,680 | 40 | 2.002 |
| Budget Analysts | | 60,620 | 640 | 1.945 |
| Construction and Building Inspectors | | 72,200 | 760 | 1.939 |
| Tour Guides and Escorts | | 28,680 | 300 | 1.927 |
| Photographers | | 61,250 | 640 | 1.925 |
| Skin Care Specialists | | 14,470 | 150 | 1.909 |
| Law Teachers, Postsecondary | | 9,660 | 100 | 1.907 |
| Electrical and Electronic Engineering Technicians | | 220,800 | 2,280 | 1.902 |
| Credit Authorizers, Checkers, and Clerks | | 78,450 | 810 | 1.902 |
| Door-To-Door Sales Workers, News and Street Vendors, and Related Workers | | 28,090 | 290 | 1.901 |
| Adult Literacy, Remedial Education, and Ged Teachers and Instructors | | 58,310 | 600 | 1.895 |
| Hazardous Materials Removal Workers | | 36,660 | 370 | 1.859 |
| Concierges | | 16,180 | 160 | 1.821 |
| First-Line Supervisors/Managers of Fire Fighting and Prevention Workers | | 61,260 | 590 | 1.774 |
| Management Analysts | | 363,890 | 3,500 | 1.772 |
| Electrical and Electronics Installers and Repairers, Transportation Equipment | | 16,650 | 160 | 1.770 |
| Drywall and Ceiling Tile Installers | | 121,450 | 1,160 | 1.759 |
| Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders | | 60,810 | 580 | 1.757 |
| Bill and Account Collectors | | 385,800 | 3,630 | 1.733 |
| Funeral Attendants | | 28,960 | 270 | 1.717 |
| Painters, Transportation Equipment | | 44,090 | 410 | 1.713 |
| Procurement Clerks | | 74,740 | 690 | 1.700 |
| News Analysts, Reporters and Correspondents | | 64,130 | 590 | 1.694 |
| Surgeons | | 48,920 | 450 | 1.694 |
| Atmospheric, Earth, Marine, and Space Sciences Teachers, Postsecondary | | 7,630 | 70 | 1.690 |
| Refuse and Recyclable Material Collectors | | 125,600 | 1,150 | 1.686 |
| Fire Fighters | | 275,500 | 2,520 | 1.685 |
| History Teachers, Postsecondary | | 16,710 | 150 | 1.653 |
| Atmospheric and Space Scientists | | 6,770 | 60 | 1.632 |
| Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters | | 64,730 | 570 | 1.622 |
| Kindergarten Teachers, Except Special Education | | 161,610 | 1,420 | 1.618 |
| Helpers--Installation, Maintenance, and Repair Workers | | 148,390 | 1,300 | 1.614 |
| Welders, Cutters, Solderers, and Brazers | | 382,400 | 3,340 | 1.609 |
| Audio-Visual Collections Specialists | | 10,320 | 90 | 1.606 |
| Lodging Managers | | 31,040 | 270 | 1.602 |
| Boilermakers | | 24,390 | 210 | 1.586 |
| Graduate Teaching Assistants | | 133,690 | 1,140 | 1.571 |
| Operations Research Analysts | | 57,520 | 490 | 1.569 |
| Urban and Regional Planners | | 31,130 | 260 | 1.538 |
| Electrical and Electronics Repairers, Commercial and Industrial Equipment | | 77,780 | 640 | 1.516 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Control and Valve Installers and Repairers, Except Mechanical Door | | 37,740 | 310 | 1.513 |
| Police and Sheriff's Patrol Officers | | 599,550 | 4,920 | 1.511 |
| Database Administrators | | 104,250 | 850 | 1.502 |
| Special Education Teachers, Middle School | | 87,330 | 710 | 1.497 |
| Eligibility Interviewers, Government Programs | | 97,240 | 790 | 1.496 |
| First-Line Supervisors/Managers of Construction Trades and Extraction Workers | | 514,750 | 4,170 | 1.492 |
| Cooks, Fast Food | | 601,570 | 4,830 | 1.479 |
| Cooks, Restaurant | | 674,050 | 5,410 | 1.478 |
| Education Administrators, Preschool and Child Care Center/Program | | 52,640 | 420 | 1.470 |
| Physical Therapist Aides | | 35,250 | 280 | 1.463 |
| Heating, Air Conditioning, and Refrigeration Mechanics and Installers | | 201,850 | 1,590 | 1.451 |
| First-Line Supervisors/Managers of Personal Service Workers | | 98,750 | 770 | 1.436 |
| Helpers--Carpenters | | 99,490 | 770 | 1.425 |
| Architecture and Engineering Occupations | major | 2,489,070 | 19,140 | 1.416 |
| Paralegals and Legal Assistants | | 183,550 | 1,410 | 1.415 |
| Environmental Scientists and Specialists, Including Health | | 57,430 | 440 | 1.411 |
| Education Administrators, Postsecondary | | 94,120 | 720 | 1.409 |
| Writers and Authors | | 40,980 | 310 | 1.393 |
| Rolling Machine Setters, Operators, and Tenders, Metal and Plastic | | 45,090 | 340 | 1.389 |
| Electric Motor, Power Tool, and Related Repairers | | 29,240 | 220 | 1.386 |
| Veterinarians | | 41,240 | 310 | 1.384 |
| Surveyors | | 54,650 | 410 | 1.382 |
| Purchasing Agents, Except Wholesale, Retail, and Farm Products | | 228,360 | 1,710 | 1.379 |
| Mental Health and Substance Abuse Social Workers | | 85,550 | 640 | 1.378 |
| Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop | | 286,750 | 2,140 | 1.375 |
| Computer Systems Analysts | | 448,270 | 3,330 | 1.368 |
| Office Machine Operators, Except Computer | | 90,240 | 670 | 1.367 |
| Airfield Operations Specialists | | 5,390 | 40 | 1.367 |
| Computer and Information Scientists, Research | | 25,620 | 190 | 1.366 |
| Environmental Science and Protection Technicians, Including Health | | 25,750 | 190 | 1.359 |
| Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters | | 79,980 | 590 | 1.359 |
| First-Line Supervisors/Managers of Food Preparation and Serving Workers | | 659,380 | 4,850 | 1.355 |
| Manicurists and Pedicurists | | 30,420 | 220 | 1.332 |
| Recreation Workers | | 263,460 | 1,900 | 1.328 |
| Hairdressers, Hairstylists, and Cosmetologists | | 329,920 | 2,370 | 1.323 |
| Electrical Power-Line Installers and Repairers | | 99,140 | 710 | 1.319 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Veterinary Assistants and Laboratory Animal Caretakers | | 60,050 | 430 | 1.319 |
| Political Science Teachers, Postsecondary | | 11,230 | 80 | 1.312 |
| First-Line Supervisors/Managers of Housekeeping and Janitorial Workers | | 202,880 | 1,440 | 1.307 |
| Electricians | | 625,560 | 4,430 | 1.304 |
| Musicians and Singers | | 55,100 | 390 | 1.304 |
| Order Clerks | | 338,430 | 2,390 | 1.301 |
| Vocational Education Teachers, Secondary School | | 107,680 | 760 | 1.300 |
| Art, Drama, and Music Teachers, Postsecondary | | 55,540 | 390 | 1.293 |
| Vocational Education Teachers, Middle School | | 18,530 | 130 | 1.292 |
| Detectives and Criminal Investigators | | 87,030 | 610 | 1.291 |
| Construction Managers | | 213,960 | 1,490 | 1.283 |
| Construction and Extraction Occupations | major | 6,239,430 | 43,380 | 1.281 |
| Zoologists and Wildlife Biologists | | 12,950 | 90 | 1.280 |
| Customer Service Representatives | | 1,875,370 | 13,010 | 1.278 |
| Engineering Managers | | 214,760 | 1,450 | 1.244 |
| Human Resources Assistants, Except Payroll and Timekeeping | | 164,680 | 1,110 | 1.241 |
| Probation Officers and Correctional Treatment Specialists | | 78,640 | 530 | 1.241 |
| Helpers--Painters, Paperhangers, Plasterers, and Stucco Masons | | 29,750 | 200 | 1.238 |
| Special Education Teachers, Preschool, Kindergarten, and Elementary School | | 211,240 | 1,420 | 1.238 |
| Computer Software Engineers, Applications | | 361,690 | 2,420 | 1.232 |
| Automotive Service Technicians and Mechanics | | 701,150 | 4,660 | 1.224 |
| Shipping, Receiving, and Traffic Clerks | | 802,600 | 5,320 | 1.221 |
| Bus Drivers, School | | 469,100 | 3,100 | 1.217 |
| Helpers--Electricians | | 108,070 | 710 | 1.210 |
| Educational, Vocational, and School Counselors | | 201,500 | 1,320 | 1.207 |
| Preschool Teachers, Except Special Education | | 377,540 | 2,470 | 1.205 |
| Data Entry Keyers | | 405,000 | 2,640 | 1.201 |
| Computer Operators | | 177,990 | 1,150 | 1.190 |
| Industrial Machinery Mechanics | | 187,750 | 1,210 | 1.187 |
| Cargo and Freight Agents | | 60,530 | 390 | 1.187 |
| Couriers and Messengers | | 121,670 | 780 | 1.181 |
| Animal Control Workers | | 9,360 | 60 | 1.181 |
| Computer Programmers | | 501,550 | 3,210 | 1.179 |
| Middle School Teachers, Except Special and Vocational Education | | 571,100 | 3,650 | 1.177 |
| Waiters and Waitresses | | 1,981,810 | 12,660 | 1.177 |
| Protective Service Occupations | major | 2,957,990 | 18,780 | 1.169 |
| Producers and Directors | | 52,130 | 330 | 1.166 |
| Truck Drivers, Light Or Delivery Services | | 996,000 | 6,300 | 1.165 |
| Coating, Painting, and Spraying Machine Setters, Operators, and Tenders | | 94,050 | 590 | 1.155 |
| Parts Salespersons | | 244,410 | 1,520 | 1.145 |
| Hotel, Motel, and Resort Desk Clerks | | 176,920 | 1,100 | 1.145 |
| Retail Salespersons | | 3,917,190 | 24,350 | 1.145 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| First-Line Supervisors/Managers of Mechanics, Installers, and Repairers | | 441,700 | 2,740 | 1.143 |
| Fine Artists, Including Painters, Sculptors, and Illustrators | | 9,710 | 60 | 1.138 |
| Installation, Maintenance, and Repair Occupations | major | 5,323,070 | 32,880 | 1.138 |
| Interviewers, Except Eligibility and Loan | | 171,650 | 1,060 | 1.137 |
| Instructional Coordinators | | 88,340 | 540 | 1.126 |
| Laundry and Dry-Cleaning Workers | | 214,520 | 1,310 | 1.125 |
| Cost Estimators | | 188,840 | 1,150 | 1.122 |
| First-Line Supervisors/Managers of Retail Sales Workers | | 1,252,410 | 7,600 | 1.118 |
| Computer Science Teachers, Postsecondary | | 29,690 | 180 | 1.117 |
| Self-Enrichment Education Teachers | | 130,440 | 790 | 1.115 |
| Dental Assistants | | 267,840 | 1,620 | 1.114 |
| Counter Attendants, Cafeteria, Food Concession, and Coffee Shop | | 428,780 | 2,590 | 1.113 |
| Education Administrators, Elementary and Secondary School | | 200,440 | 1,210 | 1.112 |
| Maids and Housekeeping Cleaners | | 917,930 | 5,540 | 1.112 |
| Surveying and Mapping Technicians | | 56,430 | 340 | 1.110 |
| Hoist and Winch Operators | | 9,960 | 60 | 1.110 |
| Combined Food Preparation and Serving Workers, Including Fast Food | | 2,054,250 | 12,370 | 1.109 |
| Mobile Heavy Equipment Mechanics, Except Engines | | 116,260 | 700 | 1.109 |
| Library Assistants, Clerical | | 106,360 | 640 | 1.108 |
| Electrical Engineers | | 151,300 | 910 | 1.108 |
| Brickmasons and Blockmasons | | 109,840 | 660 | 1.107 |
| Electronics Engineers, Except Computer | | 123,210 | 740 | 1.106 |
| Computer and Mathematical Occupations | major | 2,825,870 | 16,950 | 1.105 |
| First-Line Supervisors/Managers of Police and Detectives | | 113,970 | 680 | 1.099 |
| Security Guards | | 995,510 | 5,930 | 1.097 |
| Civil Engineers | | 205,370 | 1,220 | 1.094 |
| Business and Financial Operations Occupations | major | 4,676,680 | 27,700 | 1.091 |
| Foreign Language and Literature Teachers, Postsecondary | | 18,590 | 110 | 1.090 |
| Nonfarm Animal Caretakers | | 86,230 | 510 | 1.089 |
| Computer, Automated Teller, and Office Machine Repairers | | 143,810 | 850 | 1.089 |
| Ushers, Lobby Attendants, and Ticket Takers | | 101,680 | 600 | 1.087 |
| Accountants and Auditors | | 881,390 | 5,200 | 1.087 |
| Public Relations Specialists | | 132,390 | 780 | 1.085 |
| Radiologic Technologists and Technicians | | 168,240 | 990 | 1.084 |
| Food Preparation and Serving Related Occupations | major | 9,917,660 | 58,270 | 1.082 |
| Travel Agents | | 111,310 | 650 | 1.076 |
| Receptionists and Information Clerks | | 1,046,590 | 6,100 | 1.073 |
| Film and Video Editors | | 13,750 | 80 | 1.072 |
| New Accounts Clerks | | 99,760 | 580 | 1.071 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Building and Grounds Cleaning and Maintenance Occupations | major | 4,275,340 | 24,790 | 1.068 |
| Network Systems and Data Communications Analysts | | 126,060 | 730 | 1.067 |
| Police, Fire, and Ambulance Dispatchers | | 88,550 | 510 | 1.061 |
| Education, Training, and Library Occupations | major | 7,658,480 | 44,080 | 1.060 |
| Meeting and Convention Planners | | 29,560 | 170 | 1.059 |
| Chefs and Head Cooks | | 114,930 | 660 | 1.058 |
| Telemarketers | | 437,510 | 2,510 | 1.057 |
| Arts, Design, Entertainment, Sports, and Media Occupations | major | 1,508,790 | 8,650 | 1.056 |
| Librarians | | 150,280 | 860 | 1.054 |
| Philosophy and Religion Teachers, Postsecondary | | 14,000 | 80 | 1.052 |
| Personal Care and Service Occupations | major | 2,802,050 | 15,990 | 1.051 |
| Excavating and Loading Machine and Dragline Operators | | 70,370 | 400 | 1.047 |
| Ambulance Drivers and Attendants, Except Emergency Medical Technicians | | 17,620 | 100 | 1.045 |
| Carpenters | | 851,610 | 4,830 | 1.045 |
| Speech-Language Pathologists | | 83,110 | 470 | 1.042 |
| Home Appliance Repairers | | 33,640 | 190 | 1.040 |
| Property, Real Estate, and Community Association Managers | | 156,180 | 880 | 1.038 |
| Loan Officers | | 213,450 | 1,200 | 1.035 |
| Billing and Posting Clerks and Machine Operators | | 480,610 | 2,700 | 1.035 |
| Industrial Truck and Tractor Operators | | 591,790 | 3,320 | 1.033 |
| Telecommunications Equipment Installers and Repairers, Except Line Installers | | 210,650 | 1,180 | 1.032 |
| Emergency Management Specialists | | 10,720 | 60 | 1.031 |
| Millwrights | | 69,800 | 390 | 1.029 |
| First-Line Supervisors/Managers of Landscaping, Lawn Service, and Groundskeeping Workers | | 94,930 | 530 | 1.028 |
| Medical Records and Health Information Technicians | | 142,170 | 790 | 1.023 |
| Janitors and Cleaners, Except Maids and Housekeeping Cleaners | | 2,071,920 | 11,510 | 1.023 |
| Office Clerks, General | | 2,791,420 | 15,500 | 1.023 |
| Environmental Engineers | | 48,700 | 270 | 1.021 |
| Library Technicians | | 108,580 | 600 | 1.018 |
| Construction Laborers | | 825,390 | 4,560 | 1.018 |
| Advertising Sales Agents | | 144,830 | 800 | 1.017 |
| Stationary Engineers and Boiler Operators | | 54,330 | 300 | 1.017 |
| Stock Clerks and Order Fillers | | 1,680,640 | 9,280 | 1.017 |
| First-Line Supervisors/Managers of Transportation and Material-Moving Machine and Vehicle Operators | | 197,430 | 1,090 | 1.017 |
| Aircraft Cargo Handling Supervisors | | 9,070 | 50 | 1.015 |
| Special Education Teachers, Secondary School | | 123,570 | 680 | 1.014 |
| Transportation and Material Moving Occupations | major | 9,410,660 | 51,780 | 1.013 |
| Licensed Practical and Licensed Vocational Nurses | | 683,790 | 3,740 | 1.007 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Sociology Teachers, Postsecondary | | 12,890 | 70 | 1.000 |
| Sales and Related Occupations | major | 13,418,240 | 72,630 | 0.997 |
| Occupational Health and Safety Specialists and Technicians | | 38,800 | 210 | 0.997 |
| Office and Administrative Support Occupations | major | 22,798,590 | 123,300 | 0.996 |
| Cashiers | | 3,387,580 | 18,320 | 0.996 |
| Network and Computer Systems Administrators | | 227,840 | 1,230 | 0.994 |
| Medical Equipment Preparers | | 33,540 | 180 | 0.988 |
| Secretaries, Except Legal, Medical, and Executive | | 1,800,950 | 9,640 | 0.986 |
| Landscaping and Groundskeeping Workers | | 772,800 | 4,120 | 0.982 |
| Interpreters and Translators | | 18,900 | 100 | 0.975 |
| Child, Family, and School Social Workers | | 257,080 | 1,360 | 0.974 |
| Automotive Body and Related Repairers | | 168,630 | 890 | 0.972 |
| Tile and Marble Setters | | 30,390 | 160 | 0.970 |
| First-Line Supervisors/Managers of Office and Administrative Support Workers | | 1,417,720 | 7,440 | 0.967 |
| Training and Development Specialists | | 186,780 | 980 | 0.966 |
| Psychology Teachers, Postsecondary | | 24,850 | 130 | 0.964 |
| First-Line Supervisors/Managers of Helpers, Laborers, and Material Movers, Hand | | 147,490 | 770 | 0.962 |
| Physical Therapists | | 126,450 | 660 | 0.961 |
| Ophthalmic Laboratory Technicians | | 34,490 | 180 | 0.961 |
| Insurance Sales Agents | | 269,000 | 1,400 | 0.959 |
| Elementary School Teachers, Except Special Education | | 1,452,160 | 7,520 | 0.954 |
| Economics Teachers, Postsecondary | | 11,600 | 60 | 0.953 |
| Roofers | | 118,160 | 610 | 0.951 |
| Medical and Clinical Laboratory Technologists | | 145,400 | 750 | 0.950 |
| Community and Social Services Occupations | major | 1,523,890 | 7,860 | 0.950 |
| Counter and Rental Clerks | | 434,250 | 2,230 | 0.946 |
| Pest Control Workers | | 56,570 | 290 | 0.944 |
| Mail Clerks and Mail Machine Operators, Except Postal Service | | 166,000 | 850 | 0.943 |
| Payroll and Timekeeping Clerks | | 188,570 | 960 | 0.938 |
| Public Relations Managers | | 64,920 | 330 | 0.936 |
| Maintenance and Repair Workers, General | | 1,232,280 | 6,250 | 0.934 |
| Machinists | | 390,090 | 1,970 | 0.930 |
| Nursing Aides, Orderlies, and Attendants | | 1,307,600 | 6,590 | 0.928 |
| Dental Laboratory Technicians | | 39,750 | 200 | 0.927 |
| Family and General Practitioners | | 135,290 | 680 | 0.926 |
| Clinical, Counseling, and School Psychologists | | 95,640 | 480 | 0.924 |
| Technical Writers | | 45,900 | 230 | 0.923 |
| Laborers and Freight, Stock, and Material Movers, Hand | | 2,098,180 | 10,500 | 0.922 |
| Cement Masons and Concrete Finishers | | 176,590 | 880 | 0.918 |
| Optometrists | | 24,230 | 120 | 0.912 |
| First-Line Supervisors/Managers of Non-Retail Sales Workers | | 309,460 | 1,530 | 0.911 |
| Septic Tank Servicers and Sewer Pipe Cleaners | | 16,200 | 80 | 0.910 |
| Business Teachers, Postsecondary | | 65,050 | 320 | 0.906 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Bookkeeping, Accounting, and Auditing Clerks | | 1,697,890 | 8,300 | 0.900 |
| Tire Repairers and Changers | | 86,200 | 420 | 0.897 |
| General and Operations Managers | | 2,064,220 | 10,000 | 0.892 |
| Veterinary Technologists and Technicians | | 51,790 | 250 | 0.889 |
| Dispatchers, Except Police, Fire, and Ambulance | | 170,050 | 820 | 0.888 |
| Reservation and Transportation Ticket Agents and Travel Clerks | | 183,280 | 880 | 0.884 |
| Materials Engineers | | 22,920 | 110 | 0.884 |
| Computer Software Engineers, Systems Software | | 261,520 | 1,250 | 0.880 |
| Inspectors, Testers, Sorters, Samplers, and Weighers | | 525,540 | 2,510 | 0.880 |
| Recreation and Fitness Studies Teachers, Postsecondary | | 14,700 | 70 | 0.877 |
| Demonstrators and Product Promoters | | 96,670 | 460 | 0.876 |
| Choreographers | | 12,660 | 60 | 0.873 |
| Healthcare Practitioners and Technical Occupations | major | 6,118,970 | 28,880 | 0.869 |
| Teacher Assistants | | 1,188,910 | 5,610 | 0.869 |
| Education Teachers, Postsecondary | | 40,480 | 190 | 0.864 |
| Postal Service Mail Sorters, Processors, and Processing Machine Operators | | 201,150 | 940 | 0.861 |
| Dishwashers | | 488,180 | 2,280 | 0.860 |
| Furniture Finishers | | 32,140 | 150 | 0.860 |
| Cooks, Institution and Cafeteria | | 418,180 | 1,940 | 0.854 |
| Emergency Medical Technicians and Paramedics | | 170,690 | 790 | 0.852 |
| Pipelayers | | 56,190 | 260 | 0.852 |
| Nuclear Medicine Technologists | | 17,360 | 80 | 0.849 |
| Computer and Information Systems Managers | | 267,310 | 1,230 | 0.847 |
| Food Service Managers | | 260,880 | 1,200 | 0.847 |
| Occupational Therapist Assistants | | 17,520 | 80 | 0.841 |
| Cleaners of Vehicles and Equipment | | 304,500 | 1,390 | 0.841 |
| Computer Support Specialists | | 493,240 | 2,250 | 0.840 |
| Medical and Clinical Laboratory Technicians | | 146,920 | 670 | 0.840 |
| Prepress Technicians and Workers | | 96,580 | 440 | 0.839 |
| Dental Hygienists | | 149,880 | 680 | 0.836 |
| Locker Room, Coatroom, and Dressing Room Attendants | | 19,860 | 90 | 0.835 |
| Dining Room and Cafeteria Attendants and Bartender Helpers | | 389,580 | 1,760 | 0.832 |
| Aerospace Engineering and Operations Technicians | | 15,570 | 70 | 0.828 |
| Management Occupations | major | 7,212,360 | 32,330 | 0.826 |
| Postal Service Mail Carriers | | 355,120 | 1,590 | 0.825 |
| Packaging and Filling Machine Operators and Tenders | | 379,750 | 1,700 | 0.825 |
| Locksmiths and Safe Repairers | | 13,450 | 60 | 0.822 |
| Healthcare Support Occupations | major | 3,122,870 | 13,930 | 0.822 |
| Computer Hardware Engineers | | 67,590 | 300 | 0.817 |
| Forging Machine Setters, Operators, and Tenders, Metal and Plastic | | 49,760 | 220 | 0.814 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Insurance Underwriters | | 92,780 | 410 | 0.814 |
| Cardiovascular Technologists and Technicians | | 40,990 | 180 | 0.809 |
| Employment, Recruitment, and Placement Specialists | | 173,940 | 760 | 0.805 |
| Electronic Home Entertainment Equipment Installers and Repairers | | 29,770 | 130 | 0.804 |
| Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products | | 1,352,800 | 5,900 | 0.803 |
| Medical Transcriptionists | | 94,090 | 410 | 0.803 |
| Tellers | | 532,740 | 2,310 | 0.799 |
| Transportation, Storage, and Distribution Managers | | 108,590 | 470 | 0.797 |
| Life, Physical, and Social Science Occupations | major | 1,067,730 | 4,600 | 0.793 |
| Sound Engineering Technicians | | 9,350 | 40 | 0.788 |
| Production, Planning, and Expediting Clerks | | 302,430 | 1,290 | 0.786 |
| Lay-Out Workers, Metal and Plastic | | 14,100 | 60 | 0.784 |
| Medical Secretaries | | 334,200 | 1,420 | 0.783 |
| Natural Sciences Managers | | 42,650 | 180 | 0.777 |
| Chemistry Teachers, Postsecondary | | 16,610 | 70 | 0.776 |
| Taxi Drivers and Chauffeurs | | 125,860 | 530 | 0.776 |
| Industrial Engineers | | 161,540 | 680 | 0.775 |
| Packers and Packagers, Hand | | 951,960 | 3,990 | 0.772 |
| Physical Therapist Assistants | | 47,810 | 200 | 0.770 |
| Rehabilitation Counselors | | 105,450 | 440 | 0.769 |
| Mathematical Science Teachers, Postsecondary | | 38,480 | 160 | 0.766 |
| First-Line Supervisors/Managers of Production and Operating Workers | | 733,410 | 3,030 | 0.761 |
| Loan Interviewers and Clerks | | 157,680 | 650 | 0.759 |
| Opticians, Dispensing | | 63,120 | 260 | 0.759 |
| Human Resources Managers | | 194,470 | 800 | 0.758 |
| Registered Nurses | | 2,217,990 | 9,120 | 0.757 |
| Compliance Officers, Except Agriculture, Construction, Health and Safety, and Transportation | | 136,580 | 560 | 0.755 |
| Bus Drivers, Transit and Intercity | | 190,530 | 780 | 0.754 |
| English Language and Literature Teachers, Postsecondary | | 51,370 | 210 | 0.753 |
| Residential Advisors | | 53,870 | 220 | 0.752 |
| Operating Engineers and Other Construction Equipment Operators | | 353,650 | 1,440 | 0.750 |
| Interior Designers | | 39,340 | 160 | 0.749 |
| Water and Liquid Waste Treatment Plant and System Operators | | 98,440 | 400 | 0.748 |
| Paper Goods Machine Setters, Operators, and Tenders | | 120,880 | 490 | 0.747 |
| Glaziers | | 46,960 | 190 | 0.745 |
| Market Research Analysts | | 108,940 | 440 | 0.744 |
| Secondary School Teachers, Except Special and Vocational Education | | 980,730 | 3,960 | 0.744 |
| Court, Municipal, and License Clerks | | 104,060 | 420 | 0.743 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Meter Readers, Utilities | | 52,140 | 210 | 0.742 |
| Production Occupations | major | 11,270,210 | 44,910 | 0.734 |
| Proofreaders and Copy Markers | | 25,200 | 100 | 0.731 |
| Maintenance Workers, Machinery | | 98,280 | 390 | 0.731 |
| Dietitians and Nutritionists | | 43,200 | 170 | 0.725 |
| Bartenders | | 427,010 | 1,680 | 0.725 |
| Air Traffic Controllers | | 22,990 | 90 | 0.721 |
| Pressers, Textile, Garment, and Related Materials | | 92,730 | 360 | 0.715 |
| Food Servers, Nonrestaurant | | 191,030 | 740 | 0.713 |
| Medical Assistants | | 345,930 | 1,340 | 0.713 |
| Medical and Public Health Social Workers | | 103,490 | 400 | 0.712 |
| Surgical Technologists | | 67,460 | 260 | 0.710 |
| Legal Occupations | major | 909,370 | 3,490 | 0.707 |
| Merchandise Displayers and Window Trimmers | | 49,520 | 190 | 0.707 |
| Purchasing Managers | | 107,130 | 410 | 0.705 |
| Graphic Designers | | 136,470 | 520 | 0.702 |
| Correspondence Clerks | | 34,190 | 130 | 0.700 |
| Pharmacy Aides | | 58,130 | 220 | 0.697 |
| Occupational Therapists | | 77,080 | 290 | 0.693 |
| First-Line Supervisors/Managers of Correctional Officers | | 32,090 | 120 | 0.689 |
| Switchboard Operators, Including Answering Service | | 227,660 | 850 | 0.688 |
| Plasterers and Stucco Masons | | 53,790 | 200 | 0.685 |
| Pharmacists | | 223,630 | 830 | 0.684 |
| Administrative Services Managers | | 311,600 | 1,150 | 0.680 |
| Pharmacy Technicians | | 207,140 | 760 | 0.676 |
| Biological Science Teachers, Postsecondary | | 38,580 | 140 | 0.668 |
| Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic | | 149,000 | 540 | 0.668 |
| Aircraft Mechanics and Service Technicians | | 135,250 | 490 | 0.667 |
| Chief Executives | | 455,930 | 1,650 | 0.667 |
| File Clerks | | 249,970 | 900 | 0.663 |
| Marketing Managers | | 189,140 | 680 | 0.662 |
| Postal Service Clerks | | 80,760 | 290 | 0.661 |
| Floral Designers | | 69,660 | 250 | 0.661 |
| Bus and Truck Mechanics and Diesel Engine Specialists | | 254,420 | 910 | 0.659 |
| Electrical and Electronics Repairers, Powerhouse, Substation, and Relay | | 19,680 | 70 | 0.655 |
| Statisticians | | 17,040 | 60 | 0.649 |
| Telecommunications Line Installers and Repairers | | 168,260 | 590 | 0.646 |
| Nursing Instructors and Teachers, Postsecondary | | 34,390 | 120 | 0.643 |
| Food Preparation Workers | | 855,800 | 2,970 | 0.639 |
| Executive Secretaries and Administrative Assistants | | 1,384,240 | 4,760 | 0.633 |
| Compensation, Benefits, and Job Analysis Specialists | | 81,450 | 280 | 0.633 |
| Health Educators | | 43,890 | 150 | 0.629 |
| Legal Secretaries | | 263,590 | 900 | 0.629 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Sawing Machine Setters, Operators, and Tenders, Wood | | 52,740 | 180 | 0.629 |
| Meat, Poultry, and Fish Cutters and Trimmers | | 156,670 | 530 | 0.623 |
| Tax Examiners, Collectors, and Revenue Agents | | 68,780 | 230 | 0.616 |
| Diagnostic Medical Sonographers | | 32,990 | 110 | 0.614 |
| Industrial Production Managers | | 183,050 | 610 | 0.614 |
| Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic | | 102,320 | 340 | 0.612 |
| Printing Machine Operators | | 198,710 | 660 | 0.612 |
| Directors, Religious Activities and Education | | 12,120 | 40 | 0.608 |
| Architects, Except Landscape and Naval | | 84,980 | 280 | 0.607 |
| Fire Inspectors and Investigators | | 12,160 | 40 | 0.606 |
| Commercial Pilots | | 18,380 | 60 | 0.601 |
| Civil Engineering Technicians | | 85,920 | 280 | 0.600 |
| Editors | | 105,130 | 340 | 0.596 |
| Social and Human Service Assistants | | 283,060 | 900 | 0.586 |
| Helpers--Production Workers | | 459,440 | 1,460 | 0.585 |
| Sales Managers | | 317,410 | 1,000 | 0.580 |
| Power Plant Operators | | 35,030 | 110 | 0.578 |
| Respiratory Therapists | | 82,930 | 260 | 0.577 |
| Truck Drivers, Heavy and Tractor-Trailer | | 1,548,480 | 4,850 | 0.577 |
| Computer-Controlled Machine Tool Operators, Metal and Plastic | | 140,540 | 440 | 0.577 |
| Photographic Processing Machine Operators | | 54,500 | 170 | 0.575 |
| Sewers, Hand | | 22,550 | 70 | 0.572 |
| Medical and Health Services Managers | | 227,410 | 700 | 0.567 |
| Electrical and Electronics Drafters | | 39,300 | 120 | 0.562 |
| Structural Iron and Steel Workers | | 78,700 | 240 | 0.562 |
| Clergy | | 32,940 | 100 | 0.559 |
| Elevator Installers and Repairers | | 26,450 | 80 | 0.557 |
| Bindery Workers | | 93,240 | 280 | 0.553 |
| Internists, General | | 53,310 | 160 | 0.553 |
| Financial Managers | | 570,110 | 1,700 | 0.549 |
| Administrative Law Judges, Adjudicators, and Hearing Officers | | 30,520 | 90 | 0.543 |
| Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic | | 58,060 | 170 | 0.539 |
| Wholesale and Retail Buyers, Except Farm Products | | 131,670 | 380 | 0.532 |
| Numerical Tool and Process Control Programmers | | 20,800 | 60 | 0.531 |
| Word Processors and Typists | | 229,090 | 660 | 0.531 |
| Private Detectives and Investigators | | 31,330 | 90 | 0.529 |
| Industrial Engineering Technicians | | 59,500 | 170 | 0.526 |
| Fitness Trainers and Aerobics Instructors | | 160,490 | 450 | 0.516 |
| Landscape Architects | | 17,980 | 50 | 0.512 |
| Social and Community Service Managers | | 100,810 | 280 | 0.512 |
| Funeral Directors | | 25,300 | 70 | 0.510 |
| Paving, Surfacing, and Tamping Equipment Operators | | 57,880 | 160 | 0.509 |
| Conveyor Operators and Tenders | | 61,590 | 170 | 0.508 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Lawyers | | 490,000 | 1,340 | 0.504 |
| Law Clerks | | 40,340 | 110 | 0.502 |
| Cooks, Short Order | | 228,710 | 610 | 0.491 |
| Cabinetmakers and Bench Carpenters | | 127,640 | 340 | 0.491 |
| Electromechanical Equipment Assemblers | | 63,930 | 170 | 0.490 |
| Postmasters and Mail Superintendents | | 26,640 | 70 | 0.484 |
| Recreational Therapists | | 26,830 | 70 | 0.481 |
| Mixing and Blending Machine Setters, Operators, and Tenders | | 111,610 | 290 | 0.479 |
| Correctional Officers and Jailers | | 401,250 | 1,040 | 0.477 |
| Baggage Porters and Bellhops | | 58,020 | 150 | 0.476 |
| Team Assemblers | | 1,189,840 | 3,030 | 0.469 |
| Weighers, Measurers, Checkers, and Samplers, Recordkeeping | | 78,620 | 200 | 0.469 |
| Molders, Shapers, and Casters, Except Metal and Plastic | | 39,450 | 100 | 0.467 |
| Woodworking Machine Setters, Operators, and Tenders, Except Sawing | | 91,640 | 230 | 0.462 |
| Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic | | 296,070 | 740 | 0.460 |
| Advertising and Promotions Managers | | 85,850 | 210 | 0.451 |
| Financial Examiners | | 24,570 | 60 | 0.450 |
| Credit Analysts | | 66,710 | 160 | 0.442 |
| Personal Financial Advisors | | 83,820 | 200 | 0.439 |
| Announcers | | 50,420 | 120 | 0.438 |
| Personal and Home Care Aides | | 408,360 | 970 | 0.437 |
| Child Care Workers | | 418,540 | 990 | 0.436 |
| Title Examiners, Abstractors, and Searchers | | 42,720 | 100 | 0.431 |
| Purchasing Agents and Buyers, Farm Products | | 17,640 | 40 | 0.418 |
| Medical Equipment Repairers | | 22,070 | 50 | 0.417 |
| Securities, Commodities, and Financial Services Sales Agents | | 270,730 | 610 | 0.415 |
| Economists | | 13,390 | 30 | 0.413 |
| Health Specialties Teachers, Postsecondary | | 85,220 | 190 | 0.411 |
| Chemical Engineers | | 31,710 | 70 | 0.407 |
| Painting, Coating, and Decorating Workers | | 31,770 | 70 | 0.406 |
| Insurance Claims and Policy Processing Clerks | | 258,100 | 550 | 0.392 |
| Home Health Aides | | 560,190 | 1,190 | 0.391 |
| Coin, Vending, and Amusement Machine Servicers and Repairers | | 33,100 | 70 | 0.390 |
| Financial Analysts | | 157,770 | 330 | 0.385 |
| Respiratory Therapy Technicians | | 28,700 | 60 | 0.385 |
| Highway Maintenance Workers | | 148,390 | 310 | 0.385 |
| Commercial and Industrial Designers | | 33,600 | 70 | 0.384 |
| Real Estate Brokers | | 38,530 | 80 | 0.382 |
| Electrical and Electronic Equipment Assemblers | | 302,530 | 610 | 0.371 |
| Bakers | | 154,410 | 300 | 0.358 |
| Architectural and Civil Drafters | | 99,160 | 190 | 0.353 |
| Art Directors | | 20,880 | 40 | 0.353 |
| Security and Fire Alarm Systems Installers | | 42,050 | 80 | 0.350 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Tool and Die Makers | | 112,960 | 210 | 0.342 |
| Service Station Attendants | | 107,650 | 200 | 0.342 |
| Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic | | 32,490 | 60 | 0.340 |
| Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products | | 370,330 | 660 | 0.328 |
| Sewing Machine Operators | | 308,380 | 540 | 0.323 |
| Brokerage Clerks | | 82,730 | 140 | 0.312 |
| Chemists | | 84,870 | 140 | 0.304 |
| Photographic Process Workers | | 25,420 | 40 | 0.290 |
| Cutting and Slicing Machine Setters, Operators, and Tenders | | 76,370 | 120 | 0.289 |
| Earth Drillers, Except Oil and Gas | | 19,630 | 30 | 0.281 |
| Upholsterers | | 39,780 | 60 | 0.278 |
| Actors | | 94,470 | 140 | 0.273 |
| Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders | | 76,640 | 110 | 0.264 |
| Machine Feeders and Offbearers | | 190,080 | 270 | 0.262 |
| Textile Cutting Machine Setters, Operators, and Tenders | | 37,250 | 50 | 0.247 |
| Legislators | | 67,400 | 90 | 0.246 |
| Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic | | 45,940 | 60 | 0.241 |
| Geoscientists, Except Hydrologists and Geographers | | 23,030 | 30 | 0.240 |
| Biological Technicians | | 43,560 | 50 | 0.211 |
| Farming, Fishing, and Forestry Occupations | major | 453,050 | 520 | 0.211 |
| Job Printers | | 55,210 | 60 | 0.200 |
| Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic | | 101,500 | 100 | 0.181 |
| Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic | | 107,300 | 100 | 0.172 |
| Physician Assistants | | 56,200 | 50 | 0.164 |
| Chemical Technicians | | 71,000 | 60 | 0.156 |
| Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic | | 75,650 | 50 | 0.122 |
| Farm, Ranch, and Other Agricultural Managers | | 5,720 | 0 | 0.000 |
| Gaming Managers | | 3,470 | 0 | 0.000 |
| Agents and Business Managers of Artists, Performers, and Athletes | | 10,270 | 0 | 0.000 |
| Claims Adjusters, Examiners, and Investigators | | 200,510 | 0 | 0.000 |
| Insurance Appraisers, Auto Damage | | 12,110 | 0 | 0.000 |
| Actuaries | | 13,210 | 0 | 0.000 |
| Mathematicians | | 3,080 | 0 | 0.000 |
| Mathematical Technicians | | 1,720 | 0 | 0.000 |
| Cartographers and Photogrammetrists | | 7,810 | 0 | 0.000 |
| Agricultural Engineers | | 2,550 | 0 | 0.000 |
| Biomedical Engineers | | 6,960 | 0 | 0.000 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Mining and Geological Engineers, Including Mining Safety Engineers | | 6,090 | 0 | 0.000 |
| Petroleum Engineers | | 11,420 | 0 | 0.000 |
| Mechanical Drafters | | 69,150 | 0 | 0.000 |
| Agricultural and Food Scientists | | 13,470 | 0 | 0.000 |
| Biochemists and Biophysicists | | 16,130 | 0 | 0.000 |
| Foresters | | 10,480 | 0 | 0.000 |
| Epidemiologists | | 3,970 | 0 | 0.000 |
| Medical Scientists, Except Epidemiologists | | 46,430 | 0 | 0.000 |
| Astronomers | | 900 | 0 | 0.000 |
| Hydrologists | | 7,340 | 0 | 0.000 |
| Survey Researchers | | 20,690 | 0 | 0.000 |
| Industrial-Organizational Psychologists | | 1,380 | 0 | 0.000 |
| Sociologists | | 1,820 | 0 | 0.000 |
| Geographers | | 750 | 0 | 0.000 |
| Historians | | 2,010 | 0 | 0.000 |
| Political Scientists | | 4,220 | 0 | 0.000 |
| Agricultural and Food Science Technicians | | 17,310 | 0 | 0.000 |
| Geological and Petroleum Technicians | | 11,930 | 0 | 0.000 |
| Nuclear Technicians | | 5,230 | 0 | 0.000 |
| Forensic Science Technicians | | 6,730 | 0 | 0.000 |
| Forest and Conservation Technicians | | 16,430 | 0 | 0.000 |
| | | | | |
| Substance Abuse and Behavioral Disorder Counselors | | 61,580 | 0 | 0.000 |
| Mental Health Counselors | | 72,590 | 0 | 0.000 |
| Arbitrators, Mediators, and Conciliators | | 5,060 | 0 | 0.000 |
| Judges, Magistrate Judges, and Magistrates | | 27,890 | 0 | 0.000 |
| Architecture Teachers, Postsecondary | | 4,960 | 0 | 0.000 |
| Engineering Teachers, Postsecondary | | 28,360 | 0 | 0.000 |
| Agricultural Sciences Teachers, Postsecondary | | 11,590 | 0 | 0.000 |
| Forestry and Conservation Science Teachers, Postsecondary | | 1,950 | 0 | 0.000 |
| Anthropology and Archeology Teachers, Postsecondary | | 4,240 | 0 | 0.000 |
| Area, Ethnic, and Cultural Studies Teachers, Postsecondary | | 5,070 | 0 | 0.000 |
| Geography Teachers, Postsecondary | | 3,600 | 0 | 0.000 |
| Library Science Teachers, Postsecondary | | 4,040 | 0 | 0.000 |
| Criminal Justice and Law Enforcement Teachers, Postsecondary | | 8,060 | 0 | 0.000 |
| Social Work Teachers, Postsecondary | | 6,250 | 0 | 0.000 |
| Communications Teachers, Postsecondary | | 18,110 | 0 | 0.000 |
| Home Economics Teachers, Postsecondary | | 4,350 | 0 | 0.000 |
| Fashion Designers | | 8,890 | 0 | 0.000 |
| Athletes and Sports Competitors | | 10,520 | 0 | 0.000 |
| Umpires, Referees, and Other Sports Officials | | 8,750 | 0 | 0.000 |
| Music Directors and Composers | | 7,020 | 0 | 0.000 |
| Radio Operators | | 3,260 | 0 | 0.000 |
| Audiologists | | 11,040 | 0 | 0.000 |
| Radiation Therapists | | 13,460 | 0 | 0.000 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Dietetic Technicians | | 28,940 | 0 | 0.000 |
| Psychiatric Technicians | | 59,750 | 0 | 0.000 |
| Orthotists and Prosthetists | | 4,480 | 0 | 0.000 |
| Psychiatric Aides | | 59,640 | 0 | 0.000 |
| Occupational Therapist Aides | | 7,560 | 0 | 0.000 |
| Forest Fire Inspectors and Prevention Specialists | | 1,030 | 0 | 0.000 |
| Parking Enforcement Workers | | 9,160 | 0 | 0.000 |
| Transit and Railroad Police | | 6,750 | 0 | 0.000 |
| Gaming Surveillance Officers and Gaming Investigators | | 9,470 | 0 | 0.000 |
| Gaming Supervisors | | 25,100 | 0 | 0.000 |
| Slot Key Persons | | 12,580 | 0 | 0.000 |
| Animal Trainers | | 6,860 | 0 | 0.000 |
| Gaming Dealers | | 77,540 | 0 | 0.000 |
| Gaming and Sports Book Writers and Runners | | 11,310 | 0 | 0.000 |
| Motion Picture Projectionists | | 10,280 | 0 | 0.000 |
| Costume Attendants | | 3,540 | 0 | 0.000 |
| Makeup Artists, Theatrical and Performance | | 1,240 | 0 | 0.000 |
| Flight Attendants | | 115,750 | 0 | 0.000 |
| Gaming Change Persons and Booth Cashiers | | 33,670 | 0 | 0.000 |
| Models | | 2,930 | 0 | 0.000 |
| Telephone Operators | | 57,500 | 0 | 0.000 |
| Gaming Cage Workers | | 17,140 | 0 | 0.000 |
| First-Line Supervisors/Managers of Farming, Fishing, and Forestry Workers | | 22,180 | 0 | 0.000 |
| Farm Labor Contractors | | 6,450 | 0 | 0.000 |
| Animal Breeders | | 1,630 | 0 | 0.000 |
| Graders and Sorters, Agricultural Products | | 54,110 | 0 | 0.000 |
| Agricultural Equipment Operators | | 26,580 | 0 | 0.000 |
| Farmworkers and Laborers, Crop, Nursery, and Greenhouse | | 211,020 | 0 | 0.000 |
| Forest and Conservation Workers | | 12,750 | 0 | 0.000 |
| Fallers | | 9,790 | 0 | 0.000 |
| Logging Equipment Operators | | 30,930 | 0 | 0.000 |
| Log Graders and Scalers | | 4,950 | 0 | 0.000 |
| Stonemasons | | 11,880 | 0 | 0.000 |
| Carpet Installers | | 36,340 | 0 | 0.000 |
| Floor Layers, Except Carpet, Wood, and Hard Tiles | | 13,560 | 0 | 0.000 |
| Floor Sanders and Finishers | | 8,230 | 0 | 0.000 |
| Terrazzo Workers and Finishers | | 5,800 | 0 | 0.000 |
| Tapers | | 37,920 | 0 | 0.000 |
| Paperhangers | | 9,320 | 0 | 0.000 |
| Reinforcing Iron and Rebar Workers | | 29,610 | 0 | 0.000 |
| Rail-Track Laying and Maintenance Equipment Operators | | 11,680 | 0 | 0.000 |
| Segmental Pavers | | 2,670 | 0 | 0.000 |
| Derrick Operators, Oil and Gas | | 15,150 | 0 | 0.000 |
| Rotary Drill Operators, Oil and Gas | | 15,560 | 0 | 0.000 |
| Service Unit Operators, Oil, Gas, and Mining | | 13,320 | 0 | 0.000 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Explosives Workers, Ordnance Handling Experts, and Blasters | | 4,790 | 0 | 0.000 |
| Continuous Mining Machine Operators | | 9,560 | 0 | 0.000 |
| Mine Cutting and Channeling Machine Operators | | 5,860 | 0 | 0.000 |
| Rock Splitters, Quarry | | 2,710 | 0 | 0.000 |
| Roof Bolters, Mining | | 3,990 | 0 | 0.000 |
| Roustabouts, Oil and Gas | | 37,010 | 0 | 0.000 |
| Helpers--Extraction Workers | | 30,910 | 0 | 0.000 |
| Electronic Equipment Installers and Repairers, Motor Vehicles | | 13,210 | 0 | 0.000 |
| Automotive Glass Installers and Repairers | | 21,550 | 0 | 0.000 |
| Rail Car Repairers | | 11,860 | 0 | 0.000 |
| Bicycle Repairers | | 7,730 | 0 | 0.000 |
| Recreational Vehicle Service Technicians | | 11,830 | 0 | 0.000 |
| Mechanical Door Repairers | | 10,510 | 0 | 0.000 |
| Refractory Materials Repairers, Except Brickmasons | | 3,350 | 0 | 0.000 |
| Camera and Photographic Equipment Repairers | | 5,580 | 0 | 0.000 |
| Musical Instrument Repairers and Tuners | | 4,520 | 0 | 0.000 |
| Commercial Divers | | 3,050 | 0 | 0.000 |
| Fabric Menders, Except Garment | | 2,090 | 0 | 0.000 |
| Manufactured Building and Mobile Home Installers | | 14,140 | 0 | 0.000 |
| Signal and Track Switch Repairers | | 8,550 | 0 | 0.000 |
| Aircraft Structure, Surfaces, Rigging, and Systems Assemblers | | 33,620 | 0 | 0.000 |
| Coil Winders, Tapers, and Finishers | | 43,900 | 0 | 0.000 |
| Engine and Other Machine Assemblers | | 55,820 | 0 | 0.000 |
| Structural Metal Fabricators and Fitters | | 90,480 | 0 | 0.000 |
| Fiberglass Laminators and Fabricators | | 41,520 | 0 | 0.000 |
| Timing Device Assemblers, Adjusters, and Calibrators | | 8,550 | 0 | 0.000 |
| Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders | | 18,720 | 0 | 0.000 |
| Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic | | 32,680 | 0 | 0.000 |
| Pourers and Casters, Metal | | 14,580 | 0 | 0.000 |
| Model Makers, Metal and Plastic | | 8,990 | 0 | 0.000 |
| Patternmakers, Metal and Plastic | | 6,840 | 0 | 0.000 |
| Foundry Mold and Coremakers | | 26,170 | 0 | 0.000 |
| Bookbinders | | 7,500 | 0 | 0.000 |
| Shoe and Leather Workers and Repairers | | 9,970 | 0 | 0.000 |
| Shoe Machine Operators and Tenders | | 6,440 | 0 | 0.000 |
| Textile Bleaching and Dyeing Machine Operators and Tenders | | 31,650 | 0 | 0.000 |
| Textile Knitting and Weaving Machine Setters, Operators, and Tenders | | 57,830 | 0 | 0.000 |
| Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and Tenders | | 68,530 | 0 | 0.000 |

Location Quotients for Hampton Roads Occupations

| Occupations | Group | U.S. | Hampton Roads | Location Quotient |
|---|---|---|---|---|
| Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers | | 30,370 | 0 | 0.000 |
| Fabric and Apparel Patternmakers | | 12,580 | 0 | 0.000 |
| Model Makers, Wood | | 4,320 | 0 | 0.000 |
| Patternmakers, Wood | | 4,280 | 0 | 0.000 |
| Nuclear Power Reactor Operators | | 3,310 | 0 | 0.000 |
| Power Distributors and Dispatchers | | 12,840 | 0 | 0.000 |
| Gas Plant Operators | | 12,600 | 0 | 0.000 |
| Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders | | 35,380 | 0 | 0.000 |
| Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders | | 46,470 | 0 | 0.000 |
| Grinding and Polishing Workers, Hand | | 44,050 | 0 | 0.000 |
| Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders | | 30,020 | 0 | 0.000 |
| Medical Appliance Technicians | | 12,410 | 0 | 0.000 |
| Semiconductor Processors | | 51,060 | 0 | 0.000 |
| Cementing and Gluing Machine Operators and Tenders | | 29,190 | 0 | 0.000 |
| Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders | | 18,070 | 0 | 0.000 |
| Cooling and Freezing Equipment Operators and Tenders | | 7,320 | 0 | 0.000 |
| Etchers and Engravers | | 10,330 | 0 | 0.000 |
| Tire Builders | | 13,410 | 0 | 0.000 |
| Locomotive Engineers | | 30,730 | 0 | 0.000 |
| Locomotive Firers | | 730 | 0 | 0.000 |
| Rail Yard Engineers, Dinkey Operators, and Hostlers | | 4,840 | 0 | 0.000 |
| Railroad Brake, Signal, and Switch Operators | | 17,070 | 0 | 0.000 |
| Railroad Conductors and Yardmasters | | 40,910 | 0 | 0.000 |
| Bridge and Lock Tenders | | 4,500 | 0 | 0.000 |
| Traffic Technicians | | 5,090 | 0 | 0.000 |
| Dredge Operators | | 2,920 | 0 | 0.000 |
| Loading Machine Operators, Underground Mining | | 3,370 | 0 | 0.000 |
| Gas Compressor and Gas Pumping Station Operators | | 6,070 | 0 | 0.000 |
| Pump Operators, Except Wellhead Pumpers | | 12,920 | 0 | 0.000 |
| Wellhead Pumpers | | 9,560 | 0 | 0.000 |
| Shuttle Car Operators | | 3,020 | 0 | 0.000 |
| Tank Car, Truck, and Ship Loaders | | 19,430 | 0 | 0.000 |

# Appendix C

Hampton Roads Regional Purchase Coefficients
2000

| | Regional Purchase Coefficients |
|---|---|
| Private Households | 0.998 |
| Eating and Drinking | 0.982 |
| Rest of Retail | 0.978 |
| Personal Services and Repair | 0.978 |
| Auto Repair and Service | 0.944 |
| Medical | 0.922 |
| Real Estate | 0.913 |
| Construction | 0.879 |
| Banking | 0.857 |
| Non-Profit Organizations | 0.807 |
| Amusements and Recreation | 0.797 |
| Miscellaneous Business Services | 0.754 |
| Motion Pictures | 0.726 |
| Miscellaneous Professional Services | 0.699 |
| Printing | 0.571 |
| Public Utilities | 0.562 |
| Education | 0.500 |
| Credit and Finance | 0.462 |
| Communication | 0.449 |
| Other Transportation | 0.404 |
| Insurance | 0.363 |
| Railroad | 0.341 |
| Rest of Transportation Equipment | 0.334 |
| Primary Metals | 0.305 |
| Trucking | 0.277 |
| Paper | 0.268 |
| Hotels | 0.263 |
| Local and Interurban | 0.262 |
| Air Transportation | 0.246 |
| Food | 0.232 |
| Stone, Clay, Glass | 0.228 |
| Rubber | 0.182 |
| Miscellaneous Manufacturing | 0.168 |
| Machinery and Computers | 0.139 |
| Fabricated Metals | 0.125 |
| Petroleum Products | 0.110 |
| Motor Vehicles | 0.096 |
| Chemicals | 0.077 |
| Apparel | 0.056 |
| Lumber | 0.054 |
| Electrical Equipment | 0.051 |
| Instruments | 0.037 |
| Furniture | 0.021 |
| Textiles | 0.007 |
| Tobacco Manufacturing | 0.003 |
| Leather | 0.000 |

# Appendix D - 1

Hampton Roads Exports and Imports
2000
Billions of 1996 Dollars

| | Demand | | | Output | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Exports | | | |
| | Self Supply | Imports | Demand | Self Supply | Domestic Exports | Foreign Exports | Total Exports | Output |
| Durable Manufacturing | 3.281 | 18.547 | 21.828 | 3.281 | 2.822 | 6.367 | 9.189 | 12.469 |
| Lumber | 0.029 | 0.511 | 0.54 | 0.029 | 0.196 | 0.015 | 0.211 | 0.239 |
| Furniture | 0.01 | 0.495 | 0.505 | 0.01 | 0.039 | 0.003 | 0.042 | 0.052 |
| Stone, Clay, Glass | 0.129 | 0.437 | 0.566 | 0.129 | 0.244 | 0.025 | 0.269 | 0.399 |
| Primary Metals | 0.257 | 0.585 | 0.842 | 0.257 | 0.464 | 0.084 | 0.548 | 0.804 |
| Fabricated Metals | 0.188 | 1.32 | 1.508 | 0.188 | 0.17 | 0.032 | 0.202 | 0.39 |
| Machinery and Computers | 0.644 | 3.982 | 4.626 | 0.644 | 1.49 | 0.595 | 2.085 | 2.728 |
| Electrical Equipment | 0.193 | 3.589 | 3.782 | 0.193 | 0.488 | 0.179 | 0.667 | 0.86 |
| Motor Vehicles | 0.274 | 2.593 | 2.867 | 0.274 | 0.961 | 0.212 | 1.173 | 1.447 |
| Rest of Transportation Equipment | 1.409 | 2.805 | 4.214 | 1.409 | 2.12 | 1.585 | 3.705 | 5.114 |
| Instruments | 0.071 | 1.855 | 1.926 | 0.071 | 0.131 | 0.069 | 0.2 | 0.271 |
| Miscellaneous Manufacturing | 0.076 | 0.376 | 0.452 | 0.076 | 0.064 | 0.025 | 0.089 | 0.165 |
| Non-Durable Manufacturing | 1.804 | 7.192 | 8.996 | 1.804 | 0.47 | 3.46 | 3.93 | 5.734 |
| Food | 0.596 | 1.972 | 2.568 | 0.596 | 2.381 | 0.259 | 2.64 | 3.236 |
| Tobacco Manufacturing | 0 | 0.113 | 0.113 | 0 | 0.001 | 0 | 0.001 | 0.002 |
| Textiles | 0.002 | 0.273 | 0.275 | 0.002 | 0.046 | 0.008 | 0.054 | 0.055 |
| Apparel | 0.038 | 0.647 | 0.685 | 0.038 | 0.031 | 0.011 | 0.042 | 0.08 |
| Paper | 0.181 | 0.492 | 0.673 | 0.181 | 0.113 | 0.032 | 0.145 | 0.326 |
| Printing | 0.597 | 0.449 | 1.046 | 0.597 | 0.093 | 0.019 | 0.112 | 0.71 |
| Chemicals | 0.123 | 1.468 | 1.591 | 0.123 | 0.227 | 0.078 | 0.305 | 0.428 |
| Petroleum Products | 0.125 | 1.013 | 1.138 | 0.125 | 0.157 | 0.035 | 0.192 | 0.617 |
| Rubber | 0.142 | 0.641 | 0.783 | 0.142 | 0.109 | 0.029 | 0.138 | 0.281 |
| Leather | 0 | 0.125 | 0.125 | 0 | 0 | 0 | 0 | 0 |
| Mining | 0.004 | 0.967 | 0.971 | 0.004 | 0.004 | 0.083 | 0.087 | 0.091 |
| Construction | 5.242 | 0.721 | 5.963 | 5.242 | 0.001 | 0.114 | 0.115 | 5.357 |
| Transportation and Public Utilities | 2.705 | 3.876 | 6.581 | 2.705 | 0.575 | 2.577 | 3.152 | 5.857 |
| Railroad | 0.062 | 0.119 | 0.181 | 0.062 | 0.126 | 0.025 | 0.151 | 0.212 |
| Trucking | 0.361 | 0.943 | 1.304 | 0.361 | 0.558 | 0.057 | 0.615 | 0.975 |
| Local and Interurban | 0.033 | 0.092 | 0.125 | 0.033 | 0.074 | 0 | 0.074 | 0.107 |
| Air Transportation | 0.179 | 0.549 | 0.728 | 0.179 | 0.145 | 0.095 | 0.24 | 0.42 |
| Other Transportation | 0.171 | 0.252 | 0.423 | 0.171 | 0.578 | 0.364 | 0.942 | 1.113 |
| Communication | 0.979 | 1.203 | 2.182 | 0.979 | 1.026 | 0.032 | 1.058 | 2.036 |
| Public Utilities | 0.921 | 0.718 | 1.639 | 0.921 | 0.07 | 0.003 | 0.073 | 0.994 |
| Finance, Insurance, and Real Estate | 9.119 | 2.718 | 11.837 | 9.119 | 0.476 | 3.899 | 4.375 | 13.494 |
| Banking | 1.761 | 0.294 | 2.055 | 1.761 | 0.341 | 0.129 | 0.47 | 2.231 |
| Insurance | 0.515 | 0.903 | 1.418 | 0.515 | 0.545 | 0.015 | 0.56 | 1.076 |
| Credit and Finance | 0.81 | 0.944 | 1.754 | 0.81 | 0.258 | 0.043 | 0.301 | 1.111 |
| Real Estate | 6.033 | 0.577 | 6.61 | 6.033 | 2.754 | 0.289 | 3.043 | 9.077 |
| Retail Trade | 6.015 | 0.13 | 6.145 | 6.015 | 0.013 | 1.172 | 1.185 | 7.2 |
| Eating and Drinking | 1.462 | 0.027 | 1.489 | 1.462 | 0.377 | 0.004 | 0.381 | 1.843 |
| Rest of Retail | 4.553 | 0.103 | 4.656 | 4.553 | 0.795 | 0.009 | 0.804 | 5.357 |
| Wholesale Trade | 2.719 | 1.308 | 4.027 | 2.719 | 0.46 | 0.665 | 1.125 | 3.844 |
| Services | 13.137 | 3.789 | 16.926 | 13.137 | 0.206 | 2.064 | 2.27 | 15.406 |
| Hotels | 0.155 | 0.435 | 0.59 | 0.155 | 0.625 | 0.002 | 0.627 | 0.781 |
| Personal Services and Repair | 0.716 | 0.016 | 0.732 | 0.716 | 0.176 | 0.01 | 0.186 | 0.902 |
| Private Households | 0.071 | 0 | 0.071 | 0.071 | 0.014 | 0 | 0.014 | 0.086 |
| Auto Repair and Service | 0.755 | 0.045 | 0.8 | 0.755 | 0.082 | 0 | 0.082 | 0.837 |
| Miscellaneous Business Services | 3.628 | 1.184 | 4.812 | 3.628 | 0.088 | 0.026 | 0.114 | 3.742 |
| Amusements and Recreation | 0.528 | 0.135 | 0.663 | 0.528 | 0.063 | 0.001 | 0.064 | 0.591 |
| Motion Pictures | 0.234 | 0.089 | 0.323 | 0.234 | 0.042 | 0.066 | 0.108 | 0.343 |
| Medical | 3.381 | 0.285 | 3.666 | 3.381 | 0.249 | 0 | 0.249 | 3.63 |
| Miscellaneous Professional Service | 2.578 | 1.11 | 3.688 | 2.578 | 0.405 | 0.098 | 0.503 | 3.082 |
| Education | 0.303 | 0.303 | 0.606 | 0.303 | 0.19 | 0.002 | 0.192 | 0.496 |
| Non-Profit Organizations | 0.787 | 0.188 | 0.975 | 0.787 | 0.13 | 0.001 | 0.131 | 0.917 |
| Agri/Forestry/Fishing Services | 0.24 | 0.05 | 0.29 | 0.24 | 0.012 | 0.05 | 0.062 | 0.302 |
| Total | 80.326 | 75.553 | 155.879 | 80.326 | 24.275 | 25.017 | 49.292 | 129.917 |

# Appendix D – 2

Hampton Roads Commodity Trade Flows
2001
(Millions of Dollars)

| | Exports | | | Imports | | |
|---|---|---|---|---|---|---|
| | Foreign Exports | Domestic Exports | Total Exports | Intermediate Imports | Institutional Imports | Total Imports |
| Oilseed farming | $6.75 | $34.20 | $40.95 | $6.09 | $0.54 | $6.63 |
| Grain farming | $4.38 | $14.96 | $19.33 | $17.63 | $5.41 | $23.04 |
| Vegetable and melon farming | $0.10 | $0.54 | $0.64 | $12.47 | $61.69 | $74.16 |
| Tree nut farming | $0.11 | $0.00 | $0.11 | $14.12 | $5.21 | $19.33 |
| Fruit farming | $0.56 | $1.31 | $1.87 | $33.00 | $49.64 | $82.64 |
| Greenhouse and nursery production | $0.83 | $19.89 | $20.72 | $18.31 | $43.88 | $62.19 |
| Tobacco farming | $0.00 | $0.00 | $0.00 | $0.02 | $0.00 | $0.02 |
| Cotton farming | $13.17 | $13.30 | $26.48 | $0.61 | $1.13 | $1.74 |
| Sugarcane and sugar beet farming | $0.00 | $0.00 | $0.00 | $0.25 | $0.00 | $0.25 |
| All other crop farming | $1.13 | $14.17 | $15.30 | $28.63 | $1.28 | $29.91 |
| Cattle ranching and farming | $0.02 | $0.00 | $0.02 | $754.26 | $1.52 | $755.78 |
| Poultry and egg production | $0.08 | $5.37 | $5.46 | $7.10 | $16.08 | $23.18 |
| Animal production- except cattle and poultry and e | $0.86 | $0.00 | $0.86 | $315.37 | $9.39 | $324.76 |
| Logging | $4.20 | $0.00 | $4.20 | $7.72 | $0.01 | $7.73 |
| Forest nurseries- forest products- and timber trac | $0.39 | $17.94 | $18.33 | $23.45 | $0.02 | $23.48 |
| Fishing | $20.88 | $0.00 | $20.88 | $71.02 | $12.38 | $83.40 |
| Hunting and trapping | $0.00 | $2.57 | $2.57 | $0.00 | $13.52 | $13.52 |
| Agriculture and forestry support activities | $0.03 | $27.65 | $27.67 | $22.16 | $2.56 | $24.71 |
| Oil and gas extraction | $0.00 | $0.00 | $0.00 | $469.92 | $0.00 | $469.92 |
| Coal mining | $0.00 | $0.00 | $0.00 | $93.97 | $0.72 | $94.70 |
| Iron ore mining | $0.00 | $0.00 | $0.00 | $0.32 | $0.00 | $0.32 |
| Copper- nickel- lead- and zinc mining | $0.00 | $2.20 | $2.20 | $0.00 | $0.00 | $0.00 |
| Gold- silver- and other metal ore mining | $0.00 | $1.28 | $1.28 | $2.06 | $0.00 | $2.06 |
| Stone mining and quarrying | $0.00 | $1.12 | $1.12 | $37.65 | $1.96 | $39.61 |
| Sand- gravel- clay- and refractory mining | $3.08 | $19.06 | $22.14 | $27.38 | $0.07 | $27.45 |
| Other nonmetallic mineral mining | $0.00 | $0.61 | $0.61 | $11.64 | $5.17 | $16.81 |
| Drilling oil and gas wells | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Support activities for oil and gas operations | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Support activities for other mining | $0.00 | $0.12 | $0.12 | $0.61 | $0.00 | $0.61 |
| Power generation and supply | $1.91 | $153.45 | $155.36 | $88.94 | $172.50 | $261.45 |
| Natural gas distribution | $0.29 | $0.00 | $0.29 | $106.52 | $175.44 | $281.96 |
| Water- sewage and other systems | $0.02 | $28.44 | $28.46 | $0.00 | $0.00 | $0.00 |
| New residential 1-unit structures- nonfarm | $0.00 | $0.00 | $0.00 | $0.00 | $0.52 | $0.52 |
| New multifamily housing structures- nonfarm | $0.00 | $0.00 | $0.00 | $0.00 | $24.31 | $24.31 |
| New residential additions and alterations- nonfarm | $0.00 | $0.00 | $0.00 | $0.00 | $24.20 | $24.20 |
| New farm housing units and additions and alteratio | $0.00 | $0.03 | $0.03 | $0.00 | $0.00 | $0.00 |
| Manufacturing and industrial buildings | $0.00 | $0.00 | $0.00 | $0.00 | $26.37 | $26.37 |
| Commercial and institutional buildings | $0.00 | $0.00 | $0.00 | $0.00 | $115.64 | $115.64 |
| Highway- street- bridge- and tunnel construction | $0.00 | $0.00 | $0.00 | $0.00 | $13.55 | $13.55 |
| Water- sewer- and pipeline construction | $0.00 | $21.86 | $21.86 | $0.00 | $0.00 | $0.00 |
| Other new construction | $0.00 | $0.00 | $0.00 | $0.00 | $302.42 | $302.42 |
| Maintenance and repair of farm and nonfarm residen | $0.04 | $9.54 | $9.58 | $0.00 | $0.00 | $0.00 |
| Maintenance and repair of nonresidential buildings | $0.46 | $11.18 | $11.64 | $0.00 | $0.00 | $0.00 |
| Maintenance and repair of highways- streets- bridg | $0.00 | $4.88 | $4.88 | $0.00 | $0.00 | $0.00 |
| Other maintenance and repair construction | $0.00 | $0.00 | $0.00 | $3.48 | $2.66 | $6.13 |
| Dog and cat food manufacturing | $0.00 | $0.00 | $0.00 | $1.03 | $46.13 | $47.16 |
| Other animal food manufacturing | $0.20 | $4.43 | $4.63 | $7.40 | $4.68 | $12.08 |
| Flour milling | $0.15 | $2.31 | $2.46 | $11.52 | $6.57 | $18.09 |
| Rice milling | $0.00 | $1.04 | $1.04 | $0.69 | $6.11 | $6.80 |
| Malt manufacturing | $0.00 | $0.00 | $0.00 | $0.41 | $0.00 | $0.41 |
| Wet corn milling | $0.00 | $0.00 | $0.00 | $13.15 | $3.39 | $16.54 |
| Soybean processing | $0.00 | $0.00 | $0.00 | $1.36 | $0.32 | $1.68 |
| Other oilseed processing | $0.00 | $0.03 | $0.03 | $1.50 | $2.48 | $3.99 |
| Fats and oils refining and blending | $0.00 | $0.00 | $0.00 | $8.09 | $16.65 | $24.74 |
| Breakfast cereal manufacturing | $0.00 | $0.65 | $0.65 | $3.87 | $44.48 | $48.35 |
| Sugar manufacturing | $0.00 | $0.00 | $0.00 | $8.31 | $13.33 | $21.64 |
| Confectionery manufacturing from cacao beans | $0.00 | $1.48 | $1.48 | $2.15 | $2.54 | $4.69 |
| Confectionery manufacturing from purchased chocola | $0.00 | $2.36 | $2.36 | $1.72 | $53.32 | $55.04 |
| Nonchocolate confectionery manufacturing | $1.81 | $25.35 | $27.16 | $6.36 | $32.70 | $39.06 |
| Frozen food manufacturing | $0.05 | $4.85 | $4.89 | $21.22 | $90.17 | $111.39 |
| Fruit and vegetable canning and drying | $0.96 | $19.62 | $20.58 | $33.40 | $120.41 | $153.81 |
| Fluid milk manufacturing | $0.11 | $0.00 | $0.11 | $14.87 | $44.54 | $59.42 |
| Creamery butter manufacturing | $0.00 | $0.00 | $0.00 | $4.62 | $5.33 | $9.95 |

Hampton Roads Commodity Trade Flows
2001
(Millions of Dollars)

| | Exports | | | Imports | | |
|---|---|---|---|---|---|---|
| | Foreign Exports | Domestic Exports | Total Exports | Intermediate Imports | Institutional Imports | Total Imports |
| Cheese manufacturing | $0.00 | $0.00 | $0.00 | $37.75 | $49.66 | $87.41 |
| Dry- condensed- and evaporated dairy products | $0.00 | $0.00 | $0.00 | $10.10 | $26.08 | $36.18 |
| Ice cream and frozen dessert manufacturing | $0.00 | $0.00 | $0.00 | $24.90 | $14.09 | $38.99 |
| Animal- except poultry- slaughtering | $193.42 | $783.85 | $977.27 | $21.05 | $14.25 | $35.30 |
| Meat processed from carcasses | $8.55 | $210.62 | $219.17 | $3.53 | $7.28 | $10.81 |
| Rendering and meat byproduct processing | $8.61 | $51.88 | $60.49 | $0.87 | $0.00 | $0.87 |
| Poultry processing | $0.00 | $0.00 | $0.00 | $33.74 | $118.36 | $152.10 |
| Seafood product preparation and packaging | $6.81 | $86.62 | $93.43 | $6.44 | $3.12 | $9.56 |
| Frozen cakes and other pastries manufacturing | $0.00 | $0.00 | $0.00 | $0.60 | $14.72 | $15.32 |
| Bread and bakery product- except frozen- manufactu | $1.53 | $0.00 | $1.53 | $32.09 | $48.12 | $80.21 |
| Cookie and cracker manufacturing | $0.00 | $0.00 | $0.00 | $4.96 | $34.84 | $39.79 |
| Mixes and dough made from purchased flour | $1.35 | $8.05 | $9.39 | $0.20 | $1.30 | $1.51 |
| Dry pasta manufacturing | $0.00 | $0.00 | $0.00 | $1.14 | $5.49 | $6.63 |
| Tortilla manufacturing | $0.00 | $0.00 | $0.00 | $0.76 | $5.68 | $6.44 |
| Roasted nuts and peanut butter manufacturing | $8.61 | $155.72 | $164.33 | $15.14 | $15.45 | $30.59 |
| Other snack food manufacturing | $0.00 | $0.00 | $0.00 | $6.58 | $51.82 | $58.39 |
| Coffee and tea manufacturing | $17.67 | $163.91 | $181.57 | $6.46 | $10.19 | $16.64 |
| Flavoring syrup and concentrate manufacturing | $0.00 | $0.00 | $0.00 | $25.90 | $0.56 | $26.45 |
| Mayonnaise- dressing- and sauce manufacturing | $0.47 | $0.00 | $0.47 | $10.88 | $12.29 | $23.16 |
| Spice and extract manufacturing | $0.36 | $0.00 | $0.36 | $6.73 | $11.08 | $17.81 |
| All other food manufacturing | $2.64 | $0.00 | $2.64 | $7.03 | $43.45 | $50.48 |
| Soft drink and ice manufacturing | $0.91 | $115.23 | $116.14 | $28.37 | $157.80 | $186.17 |
| Breweries | $0.25 | $12.70 | $12.96 | $18.09 | $82.82 | $100.91 |
| Wineries | $0.00 | $0.00 | $0.00 | $6.74 | $43.98 | $50.72 |
| Distilleries | $0.00 | $0.17 | $0.17 | $5.50 | $26.68 | $32.17 |
| Tobacco stemming and redrying | $0.00 | $0.00 | $0.00 | $0.06 | $0.00 | $0.06 |
| Cigarette manufacturing | $0.10 | $0.00 | $0.10 | $0.00 | $235.86 | $235.86 |
| Other tobacco product manufacturing | $0.00 | $0.00 | $0.00 | $0.02 | $17.14 | $17.15 |
| Fiber- yarn- and thread mills | $0.00 | $0.34 | $0.34 | $14.95 | $1.48 | $16.43 |
| Broadwoven fabric mills | $0.17 | $2.38 | $2.55 | $23.48 | $17.92 | $41.40 |
| Narrow fabric mills and schiffli embroidery | $20.85 | $18.59 | $39.45 | $2.12 | $7.15 | $9.27 |
| Nonwoven fabric mills | $0.00 | $1.71 | $1.71 | $12.68 | $2.26 | $14.95 |
| Knit fabric mills | $0.00 | $0.56 | $0.56 | $1.54 | $0.81 | $2.35 |
| Textile and fabric finishing mills | $0.02 | $2.28 | $2.30 | $8.22 | $0.46 | $8.68 |
| Fabric coating mills | $0.00 | $0.15 | $0.15 | $6.39 | $0.43 | $6.83 |
| Carpet and rug mills | $0.00 | $0.13 | $0.13 | $11.18 | $36.89 | $48.07 |
| Curtain and linen mills | $1.94 | $31.02 | $32.97 | $7.93 | $62.65 | $70.58 |
| Textile bag and canvas mills | $0.61 | $14.62 | $15.23 | $12.89 | $5.70 | $18.59 |
| Tire cord and tire fabric mills | $0.00 | $0.19 | $0.19 | $0.22 | $0.00 | $0.22 |
| Other miscellaneous textile product mills | $3.90 | $29.92 | $33.82 | $15.06 | $20.08 | $35.14 |
| Sheer hosiery mills | $0.00 | $0.00 | $0.00 | $0.00 | $15.32 | $15.32 |
| Other hosiery and sock mills | $0.00 | $0.00 | $0.00 | $0.00 | $10.29 | $10.29 |
| Other apparel knitting mills | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Cut and sew apparel manufacturing | $2.70 | $0.00 | $2.70 | $16.45 | $489.74 | $506.19 |
| Accessories and other apparel manufacturing | $8.14 | $2.77 | $10.92 | $1.18 | $21.15 | $22.33 |
| Leather and hide tanning and finishing | $0.00 | $0.00 | $0.00 | $8.89 | $0.00 | $8.89 |
| Footwear manufacturing | $0.00 | $0.00 | $0.00 | $0.02 | $110.97 | $110.99 |
| Other leather product manufacturing | $0.00 | $0.00 | $0.00 | $0.69 | $35.28 | $35.97 |
| Sawmills | $5.83 | $0.00 | $5.83 | $70.67 | $0.96 | $71.63 |
| Wood preservation | $0.60 | $11.89 | $12.49 | $4.79 | $0.03 | $4.82 |
| Reconstituted wood product manufacturing | $0.00 | $0.00 | $0.00 | $31.41 | $0.67 | $32.08 |
| Veneer and plywood manufacturing | $2.02 | $0.00 | $2.02 | $20.45 | $0.37 | $20.83 |
| Engineered wood member and truss manufacturing | $0.57 | $0.00 | $0.57 | $19.70 | $0.17 | $19.87 |
| Wood windows and door manufacturing | $0.17 | $0.00 | $0.17 | $49.15 | $0.99 | $50.15 |
| Cut stock- resawing lumber- and planing | $0.00 | $0.00 | $0.00 | $7.62 | $0.36 | $7.98 |
| Other millwork- including flooring | $0.21 | $0.00 | $0.21 | $27.97 | $0.59 | $28.56 |
| Wood container and pallet manufacturing | $0.25 | $0.00 | $0.25 | $9.32 | $1.36 | $10.69 |
| Manufactured home- mobile home- manufacturing | $0.00 | $0.00 | $0.00 | $0.00 | $0.10 | $0.10 |
| Prefabricated wood building manufacturing | $0.17 | $12.08 | $12.25 | $20.16 | $1.80 | $21.95 |
| Miscellaneous wood product manufacturing | $0.39 | $0.00 | $0.39 | $13.36 | $6.37 | $19.73 |
| Pulp mills | $0.00 | $20.31 | $20.31 | $37.85 | $0.00 | $37.85 |
| Paper and paperboard mills | $41.52 | $356.57 | $398.09 | $197.49 | $50.86 | $248.35 |

Hampton Roads Commodity Trade Flows
2001
(Millions of Dollars)

| | Exports | | | Imports | | |
|---|---|---|---|---|---|---|
| | Foreign Exports | Domestic Exports | Total Exports | Intermediate Imports | Institutional Imports | Total Imports |
| Paperboard container manufacturing | $4.92 | $108.93 | $113.85 | $123.17 | $4.67 | $127.84 |
| Flexible packaging foil manufacturing | $0.00 | $0.00 | $0.00 | $6.08 | $0.01 | $6.09 |
| Surface-coated paperboard manufactuing | $0.00 | $0.00 | $0.00 | $1.29 | $0.37 | $1.66 |
| Coated and laminated paper and packaging materials | $0.08 | $6.69 | $6.77 | $43.99 | $11.87 | $55.85 |
| Coated and uncoated paper bag manufacturing | $0.17 | $1.11 | $1.28 | $13.43 | $1.70 | $15.13 |
| Die-cut paper office supplies manufacturing | $0.00 | $0.30 | $0.30 | $9.04 | $2.82 | $11.86 |
| Envelope manufacturing | $0.00 | $0.00 | $0.00 | $11.24 | $8.39 | $19.63 |
| Stationery and related product manufacturing | $0.00 | $0.41 | $0.41 | $5.32 | $3.89 | $9.21 |
| Sanitary paper product manufacturing | $0.00 | $12.47 | $12.47 | $10.58 | $25.81 | $36.39 |
| All other converted paper product manufacturing | $4.91 | $47.46 | $52.36 | $12.49 | $11.20 | $23.69 |
| Manifold business forms printing | $0.01 | $0.27 | $0.28 | $17.73 | $26.91 | $44.64 |
| Books printing | $0.00 | $0.00 | $0.00 | $32.93 | $0.37 | $33.29 |
| Blankbook and looseleaf binder manufacturing | $0.00 | $0.23 | $0.23 | $6.57 | $7.26 | $13.83 |
| Commercial printing | $14.05 | $127.72 | $141.77 | $100.05 | $17.17 | $117.22 |
| Tradebinding and related work | $0.00 | $0.05 | $0.05 | $7.85 | $1.22 | $9.06 |
| Prepress services | $0.03 | $2.86 | $2.89 | $16.64 | $1.94 | $18.58 |
| Petroleum refineries | $23.92 | $0.00 | $23.92 | $196.75 | $241.83 | $438.58 |
| Asphalt paving mixture and block manufacturing | $0.02 | $0.00 | $0.02 | $32.77 | $1.27 | $34.03 |
| Asphalt shingle and coating materials manufacturin | $0.00 | $0.00 | $0.00 | $26.48 | $1.68 | $28.17 |
| Petroleum lubricating oil and grease manufacturing | $0.59 | $25.06 | $25.66 | $0.03 | $0.02 | $0.05 |
| All other petroleum and coal products manufacturin | $0.00 | $0.00 | $0.00 | $1.03 | $0.43 | $1.46 |
| Petrochemical manufacturing | $0.00 | $12.05 | $12.05 | $66.05 | $4.09 | $70.14 |
| Industrial gas manufacturing | $0.07 | $0.00 | $0.07 | $13.76 | $5.24 | $19.00 |
| Synthetic dye and pigment manufacturing | $0.00 | $0.43 | $0.43 | $12.34 | $3.83 | $16.18 |
| Other basic inorganic chemical manufacturing | $34.40 | $34.89 | $69.29 | $34.76 | $12.26 | $47.02 |
| Other basic organic chemical manufacturing | $39.17 | $33.74 | $72.91 | $128.19 | $16.74 | $144.93 |
| Plastics material and resin manufacturing | $81.76 | $186.35 | $268.11 | $94.62 | $0.02 | $94.64 |
| Synthetic rubber manufacturing | $0.00 | $4.09 | $4.09 | $14.99 | $0.00 | $14.99 |
| Cellulosic organic fiber manufacturing | $0.00 | $1.25 | $1.25 | $1.43 | $0.00 | $1.43 |
| Noncellulosic organic fiber manufacturing | $0.00 | $0.64 | $0.64 | $11.18 | $0.00 | $11.18 |
| Nitrogenous fertilizer manufacturing | $0.00 | $1.22 | $1.22 | $11.24 | $2.38 | $13.62 |
| Phosphatic fertilizer manufacturing | $0.06 | $44.71 | $44.76 | $24.04 | $1.87 | $25.91 |
| Fertilizer- mixing only- manufacturing | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Pesticide and other agricultural chemical manufact | $0.37 | $2.45 | $2.82 | $8.02 | $10.26 | $18.28 |
| Pharmaceutical and medicine manufacturing | $1.19 | $0.00 | $1.19 | $87.94 | $584.99 | $672.93 |
| Paint and coating manufacturing | $2.98 | $32.74 | $35.72 | $96.00 | $6.11 | $102.11 |
| Adhesive manufacturing | $0.00 | $0.00 | $0.00 | $73.04 | $5.48 | $78.52 |
| Soap and other detergent manufacturing | $0.00 | $0.00 | $0.00 | $3.27 | $67.20 | $70.47 |
| Polish and other sanitation good manufacturing | $0.19 | $0.00 | $0.19 | $7.17 | $30.25 | $37.41 |
| Surface active agent manufacturing | $0.00 | $0.00 | $0.00 | $67.06 | $2.31 | $69.38 |
| Toilet preparation manufacturing | $0.00 | $0.00 | $0.00 | $15.28 | $143.76 | $159.04 |
| Printing ink manufacturing | $0.00 | $0.00 | $0.00 | $17.10 | $0.08 | $17.18 |
| Explosives manufacturing | $0.04 | $0.00 | $0.04 | $0.96 | $0.04 | $1.00 |
| Custom compounding of purchased resins | $0.00 | $0.00 | $0.00 | $21.18 | $0.00 | $21.18 |
| Photographic film and chemical manufacturing | $0.58 | $0.00 | $0.58 | $16.09 | $35.65 | $51.74 |
| Other miscellaneous chemical product manufacturing | $0.00 | $0.00 | $0.00 | $28.47 | $8.66 | $37.13 |
| Plastics packaging materials- film and sheet | $10.61 | $0.00 | $10.61 | $13.34 | $2.54 | $15.88 |
| Plastics pipe- fittings- and profile shapes | $0.00 | $0.00 | $0.00 | $38.17 | $0.32 | $38.48 |
| Laminated plastics plate- sheet- and shapes | $0.00 | $15.46 | $15.46 | $0.00 | $0.00 | $0.00 |
| Plastics bottle manufacturing | $0.11 | $0.00 | $0.11 | $15.05 | $0.00 | $15.05 |
| Resilient floor covering manufacturing | $0.02 | $0.00 | $0.02 | $7.79 | $1.00 | $8.79 |
| Plastics plumbing fixtures and all other plastics | $12.62 | $0.00 | $12.62 | $187.84 | $31.30 | $219.14 |
| Foam product manufacturing | $0.00 | $0.00 | $0.00 | $45.67 | $4.16 | $49.83 |
| Tire manufacturing | $0.37 | $1.77 | $2.14 | $41.32 | $40.27 | $81.59 |
| Rubber and plastics hose and belting manufacturing | $0.27 | $0.72 | $0.99 | $12.05 | $3.94 | $15.99 |
| Other rubber product manufacturing | $2.61 | $26.61 | $29.22 | $44.70 | $21.91 | $66.61 |
| Vitreous china plumbing fixture manufacturing | $0.00 | $0.01 | $0.01 | $8.85 | $0.00 | $8.85 |
| Vitreous china and earthenware articles manufactur | $0.98 | $1.48 | $2.46 | $2.74 | $13.42 | $16.17 |
| Porcelain electrical supply manufacturing | $0.00 | $0.13 | $0.13 | $6.79 | $0.09 | $6.89 |
| Brick and structural clay tile manufacturing | $0.00 | $0.00 | $0.00 | $10.22 | $0.18 | $10.40 |
| Ceramic wall and floor tile manufacturing | $0.00 | $0.03 | $0.03 | $13.61 | $0.15 | $13.76 |
| Nonclay refractory manufacturing | $0.00 | $0.05 | $0.05 | $2.79 | $0.00 | $2.79 |

Hampton Roads Commodity Trade Flows
2001
(Millions of Dollars)

| | Exports | | | Imports | | |
|---|---|---|---|---|---|---|
| | Foreign Exports | Domestic Exports | Total Exports | Intermediate Imports | Institutional Imports | Total Imports |
| Clay refractory and other structural clay products | $0.20 | $1.18 | $1.39 | $3.41 | $0.02 | $3.44 |
| Glass container manufacturing | $2.06 | $30.04 | $32.09 | $0.87 | $0.13 | $1.00 |
| Glass and glass products- except glass containers | $13.69 | $0.00 | $13.69 | $34.84 | $8.30 | $43.14 |
| Cement manufacturing | $0.02 | $3.19 | $3.21 | $40.90 | $0.26 | $41.16 |
| Ready-mix concrete manufacturing | $0.00 | $92.73 | $92.73 | $112.80 | $0.66 | $113.47 |
| Concrete block and brick manufacturing | $0.06 | $11.20 | $11.26 | $23.30 | $0.15 | $23.45 |
| Concrete pipe manufacturing | $0.00 | $15.36 | $15.36 | $14.34 | $0.00 | $14.34 |
| Other concrete product manufacturing | $0.30 | $27.24 | $27.54 | $50.07 | $0.40 | $50.46 |
| Lime manufacturing | $0.00 | $0.00 | $0.00 | $3.34 | $0.01 | $3.35 |
| Gypsum product manufacturing | $0.65 | $28.25 | $28.90 | $19.19 | $0.49 | $19.68 |
| Abrasive product manufacturing | $12.99 | $53.46 | $66.45 | $31.76 | $1.92 | $33.68 |
| Cut stone and stone product manufacturing | $0.12 | $4.28 | $4.40 | $13.81 | $5.06 | $18.87 |
| Ground or treated minerals and earths manufacturin | $0.00 | $0.43 | $0.43 | $5.72 | $0.53 | $6.25 |
| Mineral wool manufacturing | $0.00 | $0.20 | $0.20 | $28.76 | $0.00 | $28.76 |
| Miscellaneous nonmetallic mineral products | $1.72 | $8.41 | $10.13 | $10.63 | $0.09 | $10.72 |
| Iron and steel mills | $0.15 | $0.00 | $0.15 | $255.65 | $1.54 | $257.19 |
| Ferroalloy and related product manufacturing | $0.04 | $0.24 | $0.28 | $1.35 | $0.00 | $1.35 |
| Iron- steel pipe and tube from purchased steel | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Rolled steel shape manufacturing | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Steel wire drawing | $0.00 | $0.00 | $0.00 | $25.13 | $4.45 | $29.58 |
| Alumina refining | $0.00 | $0.00 | $0.00 | $0.66 | $0.13 | $0.79 |
| Primary aluminum production | $0.00 | $1.18 | $1.18 | $27.02 | $0.00 | $27.02 |
| Secondary smelting and alloying of aluminum | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Aluminum sheet- plate- and foil manufacturing | $0.00 | $0.00 | $0.00 | $62.35 | $0.00 | $62.35 |
| Aluminum extruded product manufacturing | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Other aluminum rolling and drawing | $0.00 | $0.00 | $0.00 | $1.44 | $0.00 | $1.44 |
| Primary smelting and refining of copper | $0.00 | $0.43 | $0.43 | $7.27 | $0.24 | $7.51 |
| Primary nonferrous metal- except copper and alumin | $0.00 | $0.06 | $0.06 | $20.39 | $0.00 | $20.39 |
| Copper rolling- drawing- and extruding | $0.29 | $3.49 | $3.78 | $53.73 | $0.00 | $53.73 |
| Copper wire- except mechanical- drawing | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Secondary processing of copper | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Nonferrous metal- except copper and aluminum- shap | $0.00 | $5.38 | $5.38 | $27.62 | $0.39 | $28.01 |
| Secondary processing of other nonferrous | $0.00 | $0.02 | $0.02 | $2.60 | $0.00 | $2.60 |
| Ferrous metal foundaries | $0.98 | $38.87 | $39.85 | $65.11 | $0.03 | $65.14 |
| Aluminum foundries | $0.00 | $213.26 | $213.26 | $36.41 | $0.16 | $36.57 |
| Nonferrous foundries- except aluminum | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Iron and steel forging | $0.00 | $0.08 | $0.08 | $15.12 | $0.00 | $15.12 |
| Nonferrous forging | $0.00 | $0.00 | $0.00 | $7.88 | $0.00 | $7.88 |
| Custom roll forming | $0.00 | $1.08 | $1.08 | $14.07 | $0.14 | $14.21 |
| All other forging and stamping | $0.26 | $16.16 | $16.43 | $36.85 | $5.23 | $42.07 |
| Cutlery and flatware- except precious- manufacturi | $0.00 | $0.00 | $0.00 | $1.79 | $13.48 | $15.27 |
| Hand and edge tool manufacturing | $0.00 | $0.00 | $0.00 | $17.26 | $15.49 | $32.76 |
| Saw blade and handsaw manufacturing | $0.00 | $0.01 | $0.01 | $5.06 | $2.49 | $7.55 |
| Kitchen utensil- pot- and pan manufacturing | $0.00 | $0.09 | $0.09 | $2.71 | $10.08 | $12.79 |
| Prefabricated metal buildings and components | $0.01 | $0.65 | $0.66 | $22.58 | $1.62 | $24.19 |
| Fabricated structural metal manufacturing | $1.97 | $76.59 | $78.56 | $85.92 | $0.47 | $86.39 |
| Plate work manufacturing | $0.00 | $1.43 | $1.43 | $48.70 | $0.03 | $48.73 |
| Metal window and door manufacturing | $0.15 | $9.22 | $9.37 | $64.80 | $1.02 | $65.82 |
| Sheet metal work manufacturing | $0.19 | $47.90 | $48.09 | $78.13 | $2.50 | $80.63 |
| Ornamental and architectural metal work manufactur | $0.02 | $4.57 | $4.59 | $28.80 | $0.86 | $29.66 |
| Power boiler and heat exchanger manufacturing | $0.00 | $0.32 | $0.32 | $10.55 | $0.00 | $10.55 |
| Metal tank- heavy gauge- manufacturing | $0.27 | $3.00 | $3.27 | $18.47 | $0.74 | $19.20 |
| Metal can- box- and other container manufacturing | $4.41 | $114.63 | $119.04 | $29.33 | $7.26 | $36.59 |
| Hardware manufacturing | $0.41 | $0.00 | $0.41 | $45.86 | $7.36 | $53.22 |
| Spring and wire product manufacturing | $1.27 | $0.86 | $2.13 | $19.29 | $0.74 | $20.03 |
| Machine shops | $0.00 | $32.22 | $32.22 | $41.17 | $0.20 | $41.37 |
| Turned product and screw- nut- and bolt manufactur | $2.81 | $0.00 | $2.81 | $105.60 | $1.66 | $107.26 |
| Metal heat treating | $0.00 | $0.16 | $0.16 | $12.87 | $0.00 | $12.87 |
| Metal coating and nonprecious engraving | $0.00 | $0.00 | $0.00 | $113.15 | $0.00 | $113.15 |
| Electroplating- anodizing- and coloring metal | $0.00 | $0.00 | $0.00 | $23.86 | $0.00 | $23.86 |
| Metal valve manufacturing | $7.94 | $0.00 | $7.94 | $74.27 | $142.78 | $217.05 |
| Ball and roller bearing manufacturing | $0.00 | $0.00 | $0.00 | $19.20 | $2.52 | $21.72 |

Hampton Roads Commodity Trade Flows
2001
(Millions of Dollars)

| | Exports | | | Imports | | |
|---|---|---|---|---|---|---|
| | Foreign Exports | Domestic Exports | Total Exports | Intermediate Imports | Institutional Imports | Total Imports |
| Small arms manufacturing | $0.00 | $0.21 | $0.21 | $0.66 | $12.36 | $13.02 |
| Other ordnance and accessories manufacturing | $0.00 | $0.60 | $0.60 | $0.00 | $11.67 | $11.67 |
| Fabricated pipe and pipe fitting manufacturing | $0.00 | $0.00 | $0.00 | $19.53 | $0.59 | $20.11 |
| Industrial pattern manufacturing | $0.00 | $0.75 | $0.75 | $5.70 | $0.00 | $5.70 |
| Enameled iron and metal sanitary ware manufacturin | $0.00 | $0.02 | $0.02 | $8.26 | $0.13 | $8.38 |
| Miscellaneous fabricated metal product manufacturi | $1.30 | $5.61 | $6.91 | $23.75 | $21.44 | $45.18 |
| Ammunition manufacturing | $2.51 | $9.51 | $12.02 | $0.26 | $8.22 | $8.48 |
| Farm machinery and equipment manufacturing | $4.03 | $0.02 | $4.05 | $0.49 | $2.64 | $3.13 |
| Lawn and garden equipment manufacturing | $5.02 | $2.86 | $7.88 | $0.22 | $1.82 | $2.04 |
| Construction machinery manufacturing | $11.12 | $14.02 | $25.13 | $16.10 | $36.73 | $52.83 |
| Mining machinery and equipment manufacturing | $0.00 | $1.12 | $1.12 | $0.57 | $0.00 | $0.57 |
| Oil and gas field machinery and equipment | $0.00 | $0.26 | $0.26 | $0.21 | $0.00 | $0.21 |
| Sawmill and woodworking machinery | $0.02 | $0.00 | $0.02 | $0.10 | $2.87 | $2.97 |
| Plastics and rubber industry machinery | $0.00 | $0.00 | $0.00 | $2.62 | $0.10 | $2.73 |
| Paper industry machinery manufacturing | $2.33 | $0.00 | $2.33 | $1.17 | $2.92 | $4.09 |
| Textile machinery manufacturing | $0.00 | $0.00 | $0.00 | $0.59 | $0.07 | $0.65 |
| Printing machinery and equipment manufacturing | $24.53 | $0.00 | $24.53 | $2.43 | $20.42 | $22.85 |
| Food product machinery manufacturing | $0.05 | $0.00 | $0.05 | $0.39 | $0.18 | $0.57 |
| Semiconductor machinery manufacturing | $0.00 | $0.00 | $0.00 | $6.22 | $0.00 | $6.22 |
| All other industrial machinery manufacturing | $0.10 | $0.00 | $0.10 | $3.86 | $7.66 | $11.53 |
| Office machinery manufacturing | $0.00 | $0.00 | $0.00 | $2.46 | $9.70 | $12.16 |
| Optical instrument and lens manufacturing | $35.11 | $0.00 | $35.11 | $0.92 | $24.08 | $25.00 |
| Photographic and photocopying equipment manufactur | $1.43 | $0.00 | $1.43 | $6.10 | $19.00 | $25.10 |
| Other commercial and service industry machinery ma | $1.84 | $0.00 | $1.84 | $5.60 | $20.95 | $26.55 |
| Automatic vending- commercial laundry and dryclean | $0.00 | $0.00 | $0.00 | $1.22 | $1.09 | $2.31 |
| Air purification equipment manufacturing | $0.33 | $2.94 | $3.27 | $6.65 | $0.90 | $7.55 |
| Industrial and commercial fan and blower manufactu | $1.18 | $6.34 | $7.52 | $31.31 | $2.39 | $33.70 |
| Heating equipment- except warm air furnaces | $0.00 | $0.48 | $0.48 | $17.97 | $6.73 | $24.70 |
| AC- refrigeration- and forced air heating | $9.45 | $41.46 | $50.92 | $75.41 | $24.45 | $99.86 |
| Industrial mold manufacturing | $2.98 | $19.11 | $22.09 | $5.78 | $17.93 | $23.71 |
| Metal cutting machine tool manufacturing | $10.37 | $0.00 | $10.37 | $2.99 | $14.49 | $17.48 |
| Metal forming machine tool manufacturing | $0.00 | $0.00 | $0.00 | $6.07 | $0.07 | $6.14 |
| Special tool- die- jig- and fixture manufacturing | $0.72 | $0.00 | $0.72 | $0.95 | $1.20 | $2.14 |
| Cutting tool and machine tool accessory manufactur | $0.00 | $0.00 | $0.00 | $16.27 | $0.94 | $17.21 |
| Rolling mill and other metalworking machinery | $0.00 | $0.00 | $0.00 | $0.49 | $0.00 | $0.49 |
| Turbine and turbine generator set units manufactur | $10.82 | $0.00 | $10.82 | $63.89 | $29.74 | $93.63 |
| Other engine equipment manufacturing | $4.57 | $0.00 | $4.57 | $80.87 | $8.14 | $89.02 |
| Speed changers and mechanical power transmission e | $15.25 | $0.00 | $15.25 | $24.30 | $0.05 | $24.35 |
| Pump and pumping equipment manufacturing | $20.55 | $52.80 | $73.35 | $11.40 | $37.72 | $49.12 |
| Air and gas compressor manufacturing | $22.45 | $30.37 | $52.83 | $10.86 | $30.31 | $41.17 |
| Measuring and dispensing pump manufacturing | $0.12 | $0.43 | $0.55 | $0.00 | $0.68 | $0.68 |
| Elevator and moving stairway manufacturing | $0.00 | $0.00 | $0.00 | $11.97 | $0.00 | $11.97 |
| Conveyor and conveying equipment manufacturing | $0.65 | $4.05 | $4.70 | $2.36 | $2.74 | $5.10 |
| Overhead cranes- hoists- and monorail systems | $0.02 | $5.90 | $5.93 | $7.48 | $4.01 | $11.49 |
| Industrial truck- trailer- and stacker manufacturi | $2.31 | $4.02 | $6.33 | $3.00 | $14.89 | $17.88 |
| Power-driven handtool manufacturing | $1.05 | $0.00 | $1.05 | $9.31 | $7.55 | $16.86 |
| Welding and soldering equipment manufacturing | $0.00 | $0.00 | $0.00 | $6.85 | $2.89 | $9.74 |
| Packaging machinery manufacturing | $0.08 | $0.00 | $0.08 | $2.53 | $0.37 | $2.91 |
| Industrial process furnace and oven manufacturing | $0.00 | $0.35 | $0.35 | $0.03 | $0.00 | $0.03 |
| Fluid power cylinder and actuator manufacturing | $1.21 | $7.02 | $8.22 | $15.72 | $1.46 | $17.17 |
| Fluid power pump and motor manufacturing | $0.00 | $1.59 | $1.59 | $13.43 | $0.29 | $13.71 |
| Scales- balances- and miscellaneous general purpos | $48.68 | $0.00 | $48.68 | $9.76 | $23.42 | $33.19 |
| Electronic computer manufacturing | $91.11 | $0.00 | $91.11 | $15.28 | $146.97 | $162.25 |
| Computer storage device manufacturing | $5.13 | $0.00 | $5.13 | $51.51 | $21.52 | $73.04 |
| Computer terminal manufacturing | $0.00 | $0.00 | $0.00 | $13.69 | $0.97 | $14.66 |
| Other computer peripheral equipment manufacturing | $209.96 | $0.00 | $209.96 | $46.50 | $165.44 | $211.95 |
| Telephone apparatus manufacturing | $0.00 | $0.00 | $0.00 | $34.87 | $32.46 | $67.33 |
| Broadcast and wireless communications equipment | $3.72 | $0.00 | $3.72 | $66.40 | $67.45 | $133.85 |
| Other communications equipment manufacturing | $0.06 | $0.00 | $0.06 | $15.95 | $16.56 | $32.52 |
| Audio and video equipment manufacturing | $0.78 | $0.00 | $0.78 | $46.55 | $130.51 | $177.06 |
| Electron tube manufacturing | $0.00 | $3.30 | $3.30 | $1.98 | $0.22 | $2.21 |
| Semiconductors and related device manufacturing | $194.15 | $0.00 | $194.15 | $118.13 | $10.06 | $128.19 |

Hampton Roads Commodity Trade Flows
2001
(Millions of Dollars)

| | Exports | | | Imports | | |
|---|---|---|---|---|---|---|
| | Foreign Exports | Domestic Exports | Total Exports | Intermediate Imports | Institutional Imports | Total Imports |
| All other electronic component manufacturing | $25.79 | $0.00 | $25.79 | $217.20 | $2.94 | $220.14 |
| Electromedical apparatus manufacturing | $7.30 | $0.00 | $7.30 | $7.49 | $15.73 | $23.21 |
| Search- detection- and navigation instruments | $0.72 | $0.00 | $0.72 | $2.79 | $184.71 | $187.50 |
| Automatic environmental control manufacturing | $0.02 | $0.41 | $0.43 | $12.22 | $0.00 | $12.22 |
| Industrial process variable instruments | $0.47 | $0.16 | $0.63 | $8.99 | $5.03 | $14.02 |
| Totalizing fluid meters and counting devices | $0.00 | $2.22 | $2.22 | $20.81 | $1.95 | $22.76 |
| Electricity and signal testing instruments | $3.45 | $1.62 | $5.07 | $1.05 | $6.90 | $7.94 |
| Analytical laboratory instrument manufacturing | $0.76 | $0.32 | $1.08 | $5.03 | $2.44 | $7.47 |
| Irradiation apparatus manufacturing | $0.19 | $0.00 | $0.19 | $6.76 | $1.58 | $8.35 |
| Watch- clock- and other measuring and controlling | $4.02 | $0.44 | $4.46 | $2.43 | $20.07 | $22.50 |
| Software reproducing | $0.00 | $0.00 | $0.00 | $16.28 | $0.00 | $16.28 |
| Audio and video media reproduction | $0.00 | $0.00 | $0.00 | $13.69 | $0.22 | $13.91 |
| Magnetic and optical recording media manufacturing | $2.19 | $0.00 | $2.19 | $12.04 | $2.69 | $14.73 |
| Electric lamp bulb and part manufacturing | $0.00 | $0.07 | $0.07 | $8.04 | $12.09 | $20.13 |
| Lighting fixture manufacturing | $0.27 | $3.61 | $3.88 | $45.33 | $18.13 | $63.47 |
| Electric housewares and household fan manufacturin | $0.00 | $0.00 | $0.00 | $6.38 | $25.21 | $31.59 |
| Household vacuum cleaner manufacturing | $0.00 | $0.00 | $0.00 | $1.32 | $12.06 | $13.38 |
| Household cooking appliance manufacturing | $0.00 | $0.04 | $0.04 | $2.07 | $19.63 | $21.70 |
| Household refrigerator and home freezer manufactur | $0.00 | $0.14 | $0.14 | $0.64 | $17.42 | $18.06 |
| Household laundry equipment manufacturing | $0.00 | $0.00 | $0.00 | $0.30 | $11.82 | $12.12 |
| Other major household appliance manufacturing | $0.00 | $0.00 | $0.00 | $7.89 | $7.48 | $15.37 |
| Electric power and specialty transformer manufactu | $3.48 | $9.57 | $13.05 | $2.40 | $16.58 | $18.98 |
| Motor and generator manufacturing | $13.38 | $1.17 | $14.55 | $29.63 | $14.08 | $43.70 |
| Switchgear and switchboard apparatus manufacturing | $8.18 | $26.33 | $34.51 | $28.38 | $14.58 | $42.96 |
| Relay and industrial control manufacturing | $2.44 | $2.86 | $5.31 | $32.26 | $4.20 | $36.46 |
| Storage battery manufacturing | $0.23 | $0.00 | $0.23 | $3.96 | $12.47 | $16.43 |
| Primary battery manufacturing | $0.00 | $0.00 | $0.00 | $1.18 | $12.51 | $13.68 |
| Fiber optic cable manufacturing | $0.00 | $0.00 | $0.00 | $13.21 | $0.00 | $13.21 |
| Other communication and energy wire manufacturing | $42.03 | $78.78 | $120.81 | $15.52 | $1.28 | $16.81 |
| Wiring device manufacturing | $7.46 | $28.95 | $36.41 | $52.23 | $1.98 | $54.21 |
| Carbon and graphite product manufacturing | $0.00 | $0.00 | $0.00 | $1.69 | $0.00 | $1.69 |
| Miscellaneous electrical equipment manufacturing | $0.89 | $0.00 | $0.89 | $5.51 | $20.68 | $26.19 |
| Automobile and light truck manufacturing | $187.85 | $807.41 | $995.26 | $0.00 | $1,416.42 | $1,416.42 |
| Heavy duty truck manufacturing | $0.00 | $51.83 | $51.83 | $0.05 | $32.58 | $32.63 |
| Motor vehicle body manufacturing | $0.15 | $0.00 | $0.15 | $28.08 | $2.25 | $30.32 |
| Truck trailer manufacturing | $0.00 | $0.55 | $0.55 | $2.00 | $2.82 | $4.82 |
| Motor home manufacturing | $0.00 | $0.00 | $0.00 | $0.06 | $17.04 | $17.10 |
| Travel trailer and camper manufacturing | $0.90 | $1.87 | $2.77 | $1.44 | $17.65 | $19.09 |
| Motor vehicle parts manufacturing | $217.82 | $0.00 | $217.82 | $373.59 | $31.96 | $405.55 |
| Aircraft manufacturing | $1.20 | $0.00 | $1.20 | $1.99 | $235.08 | $237.08 |
| Aircraft engine and engine parts manufacturing | $0.00 | $0.00 | $0.00 | $4.57 | $29.20 | $33.77 |
| Other aircraft parts and equipment | $2.20 | $2.39 | $4.59 | $8.84 | $12.85 | $21.70 |
| Guided missile and space vehicle manufacturing | $0.00 | $0.07 | $0.07 | $20.26 | $112.18 | $132.44 |
| Propulsion units and parts for space vehicles and | $0.00 | $0.00 | $0.00 | $0.04 | $50.36 | $50.40 |
| Railroad rolling stock manufacturing | $5.12 | $25.94 | $31.06 | $11.87 | $20.27 | $32.14 |
| Ship building and repairing | $332.75 | $2,339.15 | $2,671.90 | $19.85 | $629.61 | $649.47 |
| Boat building | $0.92 | $14.81 | $15.73 | $35.78 | $36.47 | $72.26 |
| Motorcycle- bicycle- and parts manufacturing | $0.78 | $2.82 | $3.60 | $8.94 | $25.48 | $34.42 |
| Military armored vehicles and tank parts manufactu | $0.00 | $0.26 | $0.26 | $0.00 | $19.02 | $19.02 |
| All other transportation equipment manufacturing | $0.09 | $3.39 | $3.48 | $33.25 | $13.47 | $46.73 |
| Wood kitchen cabinet and countertop manufacturing | $0.15 | $0.00 | $0.15 | $22.89 | $1.00 | $23.89 |
| Upholstered household furniture manufacturing | $0.00 | $0.00 | $0.00 | $0.00 | $47.37 | $47.37 |
| Nonupholstered wood household furniture manufactur | $1.55 | $0.00 | $1.55 | $0.02 | $72.10 | $72.12 |
| Metal household furniture manufacturing | $0.04 | $0.00 | $0.04 | $4.83 | $15.73 | $20.56 |
| Institutional furniture manufacturing | $1.66 | $0.59 | $2.25 | $0.45 | $21.35 | $21.80 |
| Other household and institutional furniture | $0.00 | $0.00 | $0.00 | $0.25 | $9.55 | $9.80 |
| Wood office furniture manufacturing | $0.00 | $0.00 | $0.00 | $0.00 | $8.57 | $8.57 |
| Custom architectural woodwork and millwork | $0.00 | $19.37 | $19.37 | $2.62 | $0.78 | $3.40 |
| Office furniture- except wood- manufacturing | $0.00 | $0.00 | $0.00 | $5.32 | $43.59 | $48.91 |
| Showcases- partitions- shelving- and lockers | $0.12 | $0.00 | $0.12 | $4.79 | $7.36 | $12.15 |
| Mattress manufacturing | $0.32 | $4.24 | $4.56 | $0.13 | $3.38 | $3.51 |
| Blind and shade manufacturing | $0.05 | $0.00 | $0.05 | $0.38 | $9.21 | $9.59 |

Hampton Roads Commodity Trade Flows
2001
(Millions of Dollars)

| | Exports | | | Imports | | |
|---|---|---|---|---|---|---|
| | Foreign Exports | Domestic Exports | Total Exports | Intermediate Imports | Institutional Imports | Total Imports |
| Laboratory apparatus and furniture manufacturing | $0.00 | $0.00 | $0.00 | $0.65 | $2.11 | $2.76 |
| Surgical and medical instrument manufacturing | $0.78 | $0.00 | $0.78 | $32.23 | $22.01 | $54.23 |
| Surgical appliance and supplies manufacturing | $0.42 | $0.00 | $0.42 | $24.25 | $43.19 | $67.44 |
| Dental equipment and supplies manufacturing | $0.00 | $0.00 | $0.00 | $10.28 | $1.04 | $11.31 |
| Ophthalmic goods manufacturing | $9.44 | $5.15 | $14.59 | $0.23 | $8.95 | $9.17 |
| Dental laboratories | $0.00 | $0.61 | $0.61 | $0.03 | $0.00 | $0.03 |
| Jewelry and silverware manufacturing | $3.38 | $6.45 | $9.84 | $2.58 | $117.02 | $119.60 |
| Sporting and athletic goods manufacturing | $8.87 | $37.96 | $46.83 | $4.29 | $69.51 | $73.80 |
| Doll- toy- and game manufacturing | $0.40 | $1.35 | $1.75 | $0.08 | $94.12 | $94.20 |
| Office supplies- except paper- manufacturing | $1.44 | $6.14 | $7.58 | $6.74 | $17.65 | $24.39 |
| Sign manufacturing | $0.34 | $31.67 | $32.01 | $4.44 | $28.57 | $33.02 |
| Gasket- packing- and sealing device manufacturing | $11.62 | $39.72 | $51.33 | $20.75 | $1.16 | $21.91 |
| Musical instrument manufacturing | $0.92 | $2.52 | $3.44 | $2.11 | $10.59 | $12.71 |
| Broom- brush- and mop manufacturing | $0.00 | $0.14 | $0.14 | $6.97 | $7.42 | $14.39 |
| Burial casket manufacturing | $0.00 | $0.02 | $0.02 | $6.72 | $0.00 | $6.72 |
| Buttons- pins- and all other miscellaneous manufac | $0.25 | $1.52 | $1.77 | $21.30 | $42.14 | $63.44 |
| Wholesale trade | $284.34 | $205.57 | $489.91 | $729.08 | $770.11 | $1,499.19 |
| Air transportation | $28.36 | $0.00 | $28.36 | $62.26 | $301.91 | $364.17 |
| Rail transportation | $0.00 | $0.00 | $0.00 | $73.93 | $36.69 | $110.62 |
| Water transportation | $171.16 | $0.00 | $171.16 | $8.80 | $140.32 | $149.12 |
| Truck transportation | $47.81 | $0.00 | $47.81 | $110.81 | $72.87 | $183.68 |
| Transit and ground passenger transportation | $0.00 | $0.00 | $0.00 | $23.00 | $32.40 | $55.40 |
| Pipeline transportation | $0.06 | $0.00 | $0.06 | $57.55 | $6.66 | $64.20 |
| Scenic and sightseeing transportation and support | $111.58 | $501.73 | $613.31 | $160.42 | $10.95 | $171.37 |
| Postal service | $2.28 | $267.59 | $269.87 | $53.19 | $32.91 | $86.10 |
| Couriers and messengers | $0.00 | $0.00 | $0.00 | $122.18 | $5.57 | $127.74 |
| Warehousing and storage | $3.22 | $0.00 | $3.22 | $11.66 | $11.47 | $23.13 |
| Motor vehicle and parts dealers | $0.00 | $134.26 | $134.26 | $4.78 | $39.82 | $44.60 |
| Furniture and home furnishings stores | $0.00 | $0.00 | $0.00 | $1.50 | $17.73 | $19.24 |
| Electronics and appliance stores | $0.00 | $0.00 | $0.00 | $26.44 | $54.95 | $81.39 |
| Building material and garden supply stores | $0.00 | $0.00 | $0.00 | $23.95 | $56.99 | $80.94 |
| Food and beverage stores | $0.00 | $0.00 | $0.00 | $43.58 | $162.54 | $206.12 |
| Health and personal care stores | $0.00 | $0.00 | $0.00 | $5.27 | $10.50 | $15.77 |
| Gasoline stations | $0.00 | $66.01 | $66.01 | $1.61 | $11.89 | $13.50 |
| Clothing and clothing accessories stores | $0.00 | $0.00 | $0.00 | $2.29 | $18.55 | $20.84 |
| Sporting goods- hobby- book and music stores | $0.00 | $0.00 | $0.00 | $7.26 | $18.85 | $26.11 |
| General merchandise stores | $0.00 | $90.49 | $90.49 | $4.30 | $27.94 | $32.24 |
| Miscellaneous store retailers | $0.00 | $0.00 | $0.00 | $7.23 | $25.48 | $32.71 |
| Nonstore retailers | $0.00 | $170.83 | $170.83 | $2.01 | $17.25 | $19.27 |
| Newpaper publishers | $0.22 | $44.67 | $44.90 | $3.64 | $58.68 | $62.33 |
| Periodical publishers | $2.24 | $51.03 | $53.28 | $33.00 | $56.21 | $89.21 |
| Book publishers | $11.80 | $132.70 | $144.50 | $29.22 | $77.92 | $107.14 |
| Database- directory- and other publishers | $0.83 | $45.35 | $46.18 | $35.14 | $42.75 | $77.88 |
| Software publishers | $5.50 | $48.14 | $53.64 | $57.21 | $164.47 | $221.69 |
| Motion picture and video industries | $15.12 | $0.00 | $15.12 | $112.28 | $37.82 | $150.10 |
| Sound recording industries | $0.04 | $0.00 | $0.04 | $7.40 | $47.17 | $54.57 |
| Radio and television broadcasting | $0.00 | $51.85 | $51.85 | $39.52 | $10.22 | $49.74 |
| Cable networks and program distribution | $0.00 | $474.47 | $474.47 | $131.68 | $152.39 | $284.07 |
| Telecommunications | $13.49 | $9.33 | $22.82 | $300.46 | $391.86 | $692.32 |
| Information services | $0.02 | $29.60 | $29.62 | $123.58 | $47.73 | $171.31 |
| Data processing services | $0.72 | $2.34 | $3.06 | $126.63 | $271.34 | $397.97 |
| Nondepository credit intermediation and related a | $0.00 | $57.86 | $57.86 | $139.54 | $11.83 | $151.38 |
| Securities- commodity contracts- investments | $15.77 | $0.00 | $15.77 | $317.18 | $266.05 | $583.23 |
| Insurance carriers | $12.12 | $424.38 | $436.50 | $344.35 | $398.69 | $743.05 |
| Insurance agencies- brokerages- and related | $0.00 | $38.63 | $38.63 | $204.74 | $0.27 | $205.02 |
| Funds- trusts- and other financial vehicles | $0.00 | $0.00 | $0.00 | $7.07 | $192.42 | $199.49 |
| Monetary authorities and depository credit interme | $76.50 | $260.35 | $336.85 | $163.82 | $594.87 | $758.69 |
| Real estate | $3.72 | $1,190.05 | $1,193.77 | $545.09 | $526.16 | $1,071.24 |
| Automotive equipment rental and leasing | $7.44 | $0.00 | $7.44 | $42.71 | $78.04 | $120.76 |
| Video tape and disc rental | $0.02 | $7.86 | $7.88 | $0.00 | $4.75 | $4.75 |
| Machinery and equipment rental and leasing | $6.33 | $0.00 | $6.33 | $99.42 | $14.48 | $113.90 |
| General and consumer goods rental except video tap | $0.10 | $15.21 | $15.31 | $11.24 | $15.45 | $26.68 |

Hampton Roads Commodity Trade Flows
2001
(Millions of Dollars)

| | Exports | | | Imports | | |
|---|---|---|---|---|---|---|
| | Foreign Exports | Domestic Exports | Total Exports | Intermediate Imports | Institutional Imports | Total Imports |
| Lessors of nonfinancial intangible assets | $36.80 | $0.00 | $36.80 | $410.01 | $0.14 | $410.15 |
| Legal services | $8.45 | $0.00 | $8.45 | $181.66 | $197.90 | $379.57 |
| Accounting and bookkeeping services | $1.45 | $0.00 | $1.45 | $80.06 | $19.72 | $99.78 |
| Architectural and engineering services | $42.46 | $79.09 | $121.55 | $143.31 | $122.07 | $265.38 |
| Specialized design services | $0.01 | $0.00 | $0.01 | $52.51 | $11.13 | $63.64 |
| Custom computer programming services | $11.60 | $51.52 | $63.12 | $2.30 | $281.37 | $283.67 |
| Computer systems design services | $6.02 | $90.75 | $96.77 | $50.14 | $64.31 | $114.45 |
| Other computer related services- including facilit | $2.59 | $0.00 | $2.59 | $62.01 | $191.52 | $253.52 |
| Management consulting services | $3.20 | $0.00 | $3.20 | $281.02 | $402.31 | $683.33 |
| Environmental and other technical consulting servi | $0.01 | $0.00 | $0.01 | $42.66 | $16.62 | $59.28 |
| Scientific research and development services | $4.45 | $20.75 | $25.20 | $25.34 | $57.25 | $82.59 |
| Advertising and related services | $2.20 | $91.25 | $93.45 | $236.00 | $13.43 | $249.42 |
| Photographic services | $0.01 | $0.67 | $0.68 | $2.03 | $9.13 | $11.16 |
| Veterinary services | $0.00 | $16.60 | $16.60 | $0.29 | $4.05 | $4.34 |
| All other miscellaneous professional and technical | $0.06 | $0.00 | $0.06 | $80.62 | $12.10 | $92.72 |
| Management of companies and enterprises | $101.51 | $250.68 | $352.19 | $182.63 | $0.00 | $182.63 |
| Office administrative services | $0.00 | $0.00 | $0.00 | $133.38 | $89.72 | $223.10 |
| Facilities support services | $0.00 | $85.77 | $85.77 | $2.57 | $21.06 | $23.64 |
| Employment services | $0.33 | $0.00 | $0.33 | $353.85 | $1,061.96 | $1,415.81 |
| Business support services | $0.84 | $230.83 | $231.67 | $56.32 | $11.33 | $67.66 |
| Travel arrangement and reservation services | $5.49 | $71.78 | $77.26 | $29.15 | $12.46 | $41.61 |
| Investigation and security services | $0.84 | $0.00 | $0.84 | $24.60 | $15.02 | $39.63 |
| Services to buildings and dwellings | $0.29 | $91.59 | $91.88 | $63.89 | $23.52 | $87.41 |
| Other support services | $0.06 | $0.00 | $0.06 | $72.58 | $9.28 | $81.86 |
| Waste management and remediation services | $0.02 | $0.00 | $0.02 | $41.11 | $25.32 | $66.43 |
| Elementary and secondary schools | $0.00 | $72.25 | $72.25 | $0.00 | $33.01 | $33.01 |
| Colleges- universities- and junior colleges | $1.88 | $359.00 | $360.88 | $14.89 | $98.34 | $113.23 |
| Other educational services | $0.00 | $0.00 | $0.00 | $75.40 | $11.45 | $86.85 |
| Home health care services | $0.00 | $37.46 | $37.46 | $0.00 | $0.00 | $0.00 |
| Offices of physicians- dentists- and other health | $0.01 | $10.10 | $10.11 | $0.00 | $118.05 | $118.05 |
| Other ambulatory health care services | $0.00 | $0.00 | $0.00 | $3.78 | $100.74 | $104.52 |
| Hospitals | $0.13 | $965.00 | $965.13 | $0.00 | $285.44 | $285.44 |
| Nursing and residential care facilities | $0.00 | $0.00 | $0.00 | $0.00 | $163.32 | $163.32 |
| Child day care services | $0.00 | $0.00 | $0.00 | $0.00 | $26.17 | $26.17 |
| Social assistance- except child day care services | $0.00 | $0.00 | $0.00 | $0.04 | $65.98 | $66.02 |
| Performing arts companies | $0.15 | $0.00 | $0.15 | $6.77 | $16.33 | $23.10 |
| Spectator sports | $0.02 | $0.00 | $0.02 | $41.61 | $33.51 | $75.12 |
| Independent artists- writers- and performers | $0.00 | $0.00 | $0.00 | $48.61 | $2.19 | $50.80 |
| Promoters of performing arts and sports and agents | $0.21 | $0.00 | $0.21 | $6.80 | $9.41 | $16.21 |
| Museums- historical sites- zoos- and parks | $0.00 | $83.90 | $83.90 | $0.00 | $7.54 | $7.54 |
| Fitness and recreational sports centers | $0.00 | $0.00 | $0.00 | $3.24 | $18.30 | $21.54 |
| Bowling centers | $0.00 | $6.05 | $6.05 | $0.15 | $1.06 | $1.21 |
| Other amusement- gambling- and recreation industri | $0.00 | $0.00 | $0.00 | $3.63 | $216.23 | $219.86 |
| Hotels and motels- including casino hotels | $0.00 | $0.00 | $0.00 | $31.13 | $80.04 | $111.17 |
| Other accommodations | $0.00 | $45.72 | $45.72 | $0.25 | $28.49 | $28.74 |
| Food services and drinking places | $2.39 | $689.51 | $691.89 | $25.81 | $189.29 | $215.10 |
| Car washes | $0.00 | $0.00 | $0.00 | $4.47 | $12.62 | $17.09 |
| Automotive repair and maintenance- except car wash | $0.04 | $0.00 | $0.04 | $100.28 | $118.53 | $218.81 |
| Electronic equipment repair and maintenance | $0.01 | $30.15 | $30.16 | $10.83 | $13.33 | $24.17 |
| Commercial machinery repair and maintenance | $0.04 | $56.13 | $56.17 | $43.66 | $8.32 | $51.99 |
| Household goods repair and maintenance | $0.08 | $18.90 | $18.98 | $6.88 | $7.82 | $14.71 |
| Personal care services | $0.00 | $54.42 | $54.42 | $0.51 | $15.89 | $16.40 |
| Death care services | $0.00 | $6.38 | $6.38 | $0.00 | $7.65 | $7.65 |
| Drycleaning and laundry services | $0.00 | $10.05 | $10.05 | $4.41 | $9.05 | $13.45 |
| Other personal services | $0.00 | $0.00 | $0.00 | $3.59 | $53.88 | $57.47 |
| Religious organizations | $0.00 | $29.64 | $29.64 | $0.00 | $50.57 | $50.57 |
| Grantmaking and giving and social advocacy organiz | $0.00 | $0.00 | $0.00 | $0.00 | $39.79 | $39.79 |
| Civic- social- professional and similar organizati | $0.57 | $56.19 | $56.76 | $18.05 | $32.50 | $50.56 |
| Private households | $0.00 | $0.00 | $0.00 | $0.00 | $6.59 | $6.59 |
| Federal electric utilities | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Other Federal Government enterprises | $0.00 | $362.92 | $362.92 | $5.57 | $0.00 | $5.57 |
| State and local government passenger transit | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |

Hampton Roads Commodity Trade Flows
2001
(Millions of Dollars)

| | Exports | | | Imports | | |
|---|---|---|---|---|---|---|
| | Foreign Exports | Domestic Exports | Total Exports | Intermediate Imports | Institutional Imports | Total Imports |
| State and local government electric utilities | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Other State and local government enterprises | $0.00 | $80.96 | $80.96 | $0.00 | $0.00 | $0.00 |
| Noncomparable imports | $0.00 | $0.00 | $0.00 | $247.48 | $831.58 | $1,079.06 |
| Scrap | $13.49 | $68.89 | $82.38 | $10.31 | $7.88 | $18.20 |
| Used and secondhand goods | $33.55 | $110.32 | $143.88 | $1.73 | $131.69 | $133.42 |
| State & Local Education | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| State & Local Non-Education | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Federal Military | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Federal Non-Military | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Rest of the world adjustment to final uses | $88.00 | $52.73 | $140.73 | $0.00 | $0.00 | $0.00 |
| Inventory valuation adjustment | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Owner-occupied dwellings | $0.00 | $920.59 | $920.59 | $0.00 | $987.34 | $987.34 |
| | $3,546.04 | $17,452.92 | $20,998.96 | $17,216.80 | $21,976.58 | $39,193.39 |

# Appendix D - 3

## Hampton Roads Commodity Imports

Data Suggest Import Substitution Possibilities
2001
(Millions of Dollars)

| | Imports | | |
|---|---|---|---|
| | Intermediate Imports | Institutional Imports | Total Imports |
| Automobile and light truck manufacturing | $0.00 | $1,416.42 | $1,416.42 |
| Monetary authorities and depository credit interme | $163.82 | $594.87 | $758.69 |
| Cattle ranching and farming | $754.26 | $1.52 | $755.78 |
| Insurance carriers | $344.35 | $398.69 | $743.05 |
| Telecommunications | $300.46 | $391.86 | $692.32 |
| Management consulting services | $281.02 | $402.31 | $683.33 |
| Pharmaceutical and medicine manufacturing | $87.94 | $584.99 | $672.93 |
| Ship building and repairing | $19.85 | $629.61 | $649.47 |
| Securities- commodity contracts- investments | $317.18 | $266.05 | $583.23 |
| Cut and sew apparel manufacturing | $16.45 | $489.74 | $506.19 |
| Oil and gas extraction | $469.92 | $0.00 | $469.92 |
| Petroleum refineries | $196.75 | $241.83 | $438.58 |
| Motor vehicle parts manufacturing | $373.59 | $31.96 | $405.55 |
| Data processing services | $126.63 | $271.34 | $397.97 |
| Legal services | $181.66 | $197.90 | $379.57 |
| Air transportation | $62.26 | $301.91 | $364.17 |
| Animal production- except cattle and poultry and e | $315.37 | $9.39 | $324.76 |
| Hospitals | $0.00 | $285.44 | $285.44 |
| Cable networks and program distribution | $131.68 | $152.39 | $284.07 |
| Custom computer programming services | $2.30 | $281.37 | $283.67 |
| Natural gas distribution | $106.52 | $175.44 | $281.96 |
| Architectural and engineering services | $143.31 | $122.07 | $265.38 |
| Power generation and supply | $88.94 | $172.50 | $261.45 |
| Iron and steel mills | $255.65 | $1.54 | $257.19 |
| Other computer related services- including facilit | $62.01 | $191.52 | $253.52 |
| Advertising and related services | $236.00 | $13.43 | $249.42 |
| Paper and paperboard mills | $197.49 | $50.86 | $248.35 |
| Aircraft manufacturing | $1.99 | $235.08 | $237.08 |
| Cigarette manufacturing | $0.00 | $235.86 | $235.86 |
| Office administrative services | $133.38 | $89.72 | $223.10 |
| Software publishers | $57.21 | $164.47 | $221.69 |
| All other electronic component manufacturing | $217.20 | $2.94 | $220.14 |
| Other amusement- gambling- and recreation industri | $3.63 | $216.23 | $219.86 |
| Plastics plumbing fixtures and all other plastics | $187.84 | $31.30 | $219.14 |
| Automotive repair and maintenance- except car wash | $100.28 | $118.53 | $218.81 |
| Metal valve manufacturing | $74.27 | $142.78 | $217.05 |
| Food services and drinking places | $25.81 | $189.29 | $215.10 |
| Other computer peripheral equipment manufacturing | $46.50 | $165.44 | $211.95 |
| Insurance agencies- brokerages- and related | $204.74 | $0.27 | $205.02 |
| Funds- trusts- and other financial vehicles | $7.07 | $192.42 | $199.49 |
| Search- detection- and navigation instruments | $2.79 | $184.71 | $187.50 |
| Soft drink and ice manufacturing | $28.37 | $157.80 | $186.17 |

## Hampton Roads Commodity Imports

Data Suggest Import Substitution Possibilities

2001

(Millions of Dollars)

| | Imports | | |
|---|---|---|---|
| | Intermediate Imports | Institutional Imports | Total Imports |
| Truck transportation | $110.81 | $72.87 | $183.68 |
| Management of companies and enterprises | $182.63 | $0.00 | $182.63 |
| Audio and video equipment manufacturing | $46.55 | $130.51 | $177.06 |
| Scenic and sightseeing transportation and support | $160.42 | $10.95 | $171.37 |
| Information services | $123.58 | $47.73 | $171.31 |
| Nursing and residential care facilities | $0.00 | $163.32 | $163.32 |
| Electronic computer manufacturing | $15.28 | $146.97 | $162.25 |
| Toilet preparation manufacturing | $15.28 | $143.76 | $159.04 |
| Fruit and vegetable canning and drying | $33.40 | $120.41 | $153.81 |
| Poultry processing | $33.74 | $118.36 | $152.10 |
| Nondepository credit intermediation and related a | $139.54 | $11.83 | $151.38 |
| Motion picture and video industries | $112.28 | $37.82 | $150.10 |
| Water transportation | $8.80 | $140.32 | $149.12 |
| Other basic organic chemical manufacturing | $128.19 | $16.74 | $144.93 |
| Broadcast and wireless communications equipment | $66.40 | $67.45 | $133.85 |
| Used and secondhand goods | $1.73 | $131.69 | $133.42 |
| Guided missile and space vehicle manufacturing | $20.26 | $112.18 | $132.44 |
| Semiconductors and related device manufacturing | $118.13 | $10.06 | $128.19 |
| Paperboard container manufacturing | $123.17 | $4.67 | $127.84 |
| Couriers and messengers | $122.18 | $5.57 | $127.74 |
| Automotive equipment rental and leasing | $42.71 | $78.04 | $120.76 |
| Jewelry and silverware manufacturing | $2.58 | $117.02 | $119.60 |
| Offices of physicians- dentists- and other health | $0.00 | $118.05 | $118.05 |
| Commercial printing | $100.05 | $17.17 | $117.22 |
| Commercial and institutional buildings | $0.00 | $115.64 | $115.64 |
| Computer systems design services | $50.14 | $64.31 | $114.45 |
| Machinery and equipment rental and leasing | $99.42 | $14.48 | $113.90 |
| Ready-mix concrete manufacturing | $112.80 | $0.66 | $113.47 |
| Colleges- universities- and junior colleges | $14.89 | $98.34 | $113.23 |
| Metal coating and nonprecious engraving | $113.15 | $0.00 | $113.15 |
| Frozen food manufacturing | $21.22 | $90.17 | $111.39 |
| Hotels and motels- including casino hotels | $31.13 | $80.04 | $111.17 |
| Footwear manufacturing | $0.02 | $110.97 | $110.99 |
| Rail transportation | $73.93 | $36.69 | $110.62 |
| Turned product and screw- nut- and bolt manufactur | $105.60 | $1.66 | $107.26 |
| Book publishers | $29.22 | $77.92 | $107.14 |
| Other ambulatory health care services | $3.78 | $100.74 | $104.52 |
| Paint and coating manufacturing | $96.00 | $6.11 | $102.11 |
| Breweries | $18.09 | $82.82 | $100.91 |
| AC- refrigeration- and forced air heating | $75.41 | $24.45 | $99.86 |
| Accounting and bookkeeping services | $80.06 | $19.72 | $99.78 |
| Coal mining | $93.97 | $0.72 | $94.70 |
| Plastics material and resin manufacturing | $94.62 | $0.02 | $94.64 |
| Doll- toy- and game manufacturing | $0.08 | $94.12 | $94.20 |

## Hampton Roads Commodity Imports

Data Suggest Import Substitution Possibilities

2001

(Millions of Dollars)

| | Imports | | |
|---|---|---|---|
| | Intermediate Imports | Institutional Imports | Total Imports |
| Turbine and turbine generator set units manufactur | $63.89 | $29.74 | $93.63 |
| All other miscellaneous professional and technical | $80.62 | $12.10 | $92.72 |
| Periodical publishers | $33.00 | $56.21 | $89.21 |
| Other engine equipment manufacturing | $80.87 | $8.14 | $89.02 |
| Services to buildings and dwellings | $63.89 | $23.52 | $87.41 |
| Other educational services | $75.40 | $11.45 | $86.85 |
| Fabricated structural metal manufacturing | $85.92 | $0.47 | $86.39 |
| Postal service | $53.19 | $32.91 | $86.10 |
| Fishing | $71.02 | $12.38 | $83.40 |
| Fruit farming | $33.00 | $49.64 | $82.64 |
| Scientific research and development services | $25.34 | $57.25 | $82.59 |
| Other support services | $72.58 | $9.28 | $81.86 |
| Tire manufacturing | $41.32 | $40.27 | $81.59 |
| Electronics and appliance stores | $26.44 | $54.95 | $81.39 |
| Building material and garden supply stores | $23.95 | $56.99 | $80.94 |
| Sheet metal work manufacturing | $78.13 | $2.50 | $80.63 |
| Bread and bakery product- except frozen- manufactu | $32.09 | $48.12 | $80.21 |
| Adhesive manufacturing | $73.04 | $5.48 | $78.52 |
| Database- directory- and other publishers | $35.14 | $42.75 | $77.88 |
| Spectator sports | $41.61 | $33.51 | $75.12 |
| Vegetable and melon farming | $12.47 | $61.69 | $74.16 |
| Sporting and athletic goods manufacturing | $4.29 | $69.51 | $73.80 |
| Computer storage device manufacturing | $51.51 | $21.52 | $73.04 |
| Boat building | $35.78 | $36.47 | $72.26 |
| Nonupholstered wood household furniture manufactur | $0.02 | $72.10 | $72.12 |
| Sawmills | $70.67 | $0.96 | $71.63 |
| Curtain and linen mills | $7.93 | $62.65 | $70.58 |
| Soap and other detergent manufacturing | $3.27 | $67.20 | $70.47 |
| Petrochemical manufacturing | $66.05 | $4.09 | $70.14 |
| Surface active agent manufacturing | $67.06 | $2.31 | $69.38 |
| Business support services | $56.32 | $11.33 | $67.66 |
| Surgical appliance and supplies manufacturing | $24.25 | $43.19 | $67.44 |
| Telephone apparatus manufacturing | $34.87 | $32.46 | $67.33 |
| Other rubber product manufacturing | $44.70 | $21.91 | $66.61 |
| Waste management and remediation services | $41.11 | $25.32 | $66.43 |
| Social assistance- except child day care services | $0.04 | $65.98 | $66.02 |
| Metal window and door manufacturing | $64.80 | $1.02 | $65.82 |
| Ferrous metal foundaries | $65.11 | $0.03 | $65.14 |
| Pipeline transportation | $57.55 | $6.66 | $64.20 |
| Specialized design services | $52.51 | $11.13 | $63.64 |
| Lighting fixture manufacturing | $45.33 | $18.13 | $63.47 |
| Buttons- pins- and all other miscellaneous manufac | $21.30 | $42.14 | $63.44 |
| Aluminum sheet- plate- and foil manufacturing | $62.35 | $0.00 | $62.35 |
| Newpaper publishers | $3.64 | $58.68 | $62.33 |

## Hampton Roads Commodity Imports

Data Suggest Import Substitution Possibilities

2001

(Millions of Dollars)

| | Imports | | |
|---|---|---|---|
| | Intermediate Imports | Institutional Imports | Total Imports |
| Greenhouse and nursery production | $18.31 | $43.88 | $62.19 |
| Fluid milk manufacturing | $14.87 | $44.54 | $59.42 |
| Environmental and other technical consulting servi | $42.66 | $16.62 | $59.28 |
| Other snack food manufacturing | $6.58 | $51.82 | $58.39 |
| Other personal services | $3.59 | $53.88 | $57.47 |
| Coated and laminated paper and packaging materials | $43.99 | $11.87 | $55.85 |
| Transit and ground passenger transportation | $23.00 | $32.40 | $55.40 |
| Confectionery manufacturing from purchased chocola | $1.72 | $53.32 | $55.04 |
| Sound recording industries | $7.40 | $47.17 | $54.57 |
| Surgical and medical instrument manufacturing | $32.23 | $22.01 | $54.23 |
| Wiring device manufacturing | $52.23 | $1.98 | $54.21 |
| Copper rolling- drawing- and extruding | $53.73 | $0.00 | $53.73 |
| Hardware manufacturing | $45.86 | $7.36 | $53.22 |
| Construction machinery manufacturing | $16.10 | $36.73 | $52.83 |
| Commercial machinery repair and maintenance | $43.66 | $8.32 | $51.99 |
| Photographic film and chemical manufacturing | $16.09 | $35.65 | $51.74 |
| Independent artists- writers- and performers | $48.61 | $2.19 | $50.80 |
| Wineries | $6.74 | $43.98 | $50.72 |
| Religious organizations | $0.00 | $50.57 | $50.57 |
| Civic- social- professional and similar organizati | $18.05 | $32.50 | $50.56 |
| All other food manufacturing | $7.03 | $43.45 | $50.48 |
| Other concrete product manufacturing | $50.07 | $0.40 | $50.46 |
| Propulsion units and parts for space vehicles and | $0.04 | $50.36 | $50.40 |
| Wood windows and door manufacturing | $49.15 | $0.99 | $50.15 |
| Foam product manufacturing | $45.67 | $4.16 | $49.83 |
| Radio and television broadcasting | $39.52 | $10.22 | $49.74 |
| Pump and pumping equipment manufacturing | $11.40 | $37.72 | $49.12 |
| Office furniture- except wood- manufacturing | $5.32 | $43.59 | $48.91 |
| Plate work manufacturing | $48.70 | $0.03 | $48.73 |
| Breakfast cereal manufacturing | $3.87 | $44.48 | $48.35 |
| Carpet and rug mills | $11.18 | $36.89 | $48.07 |
| Upholstered household furniture manufacturing | $0.00 | $47.37 | $47.37 |
| Dog and cat food manufacturing | $1.03 | $46.13 | $47.16 |
| Other basic inorganic chemical manufacturing | $34.76 | $12.26 | $47.02 |
| All other transportation equipment manufacturing | $33.25 | $13.47 | $46.73 |
| Miscellaneous fabricated metal product manufacturi | $23.75 | $21.44 | $45.18 |
| Manifold business forms printing | $17.73 | $26.91 | $44.64 |
| Motor vehicle and parts dealers | $4.78 | $39.82 | $44.60 |
| Motor and generator manufacturing | $29.63 | $14.08 | $43.70 |
| Glass and glass products- except glass containers | $34.84 | $8.30 | $43.14 |
| Switchgear and switchboard apparatus manufacturing | $28.38 | $14.58 | $42.96 |
| All other forging and stamping | $36.85 | $5.23 | $42.07 |
| Travel arrangement and reservation services | $29.15 | $12.46 | $41.61 |
| Broadwoven fabric mills | $23.48 | $17.92 | $41.40 |

## Hampton Roads Commodity Imports

Data Suggest Import Substitution Possibilities

2001

(Millions of Dollars)

| | Imports | | |
|---|---|---|---|
| | Intermediate Imports | Institutional Imports | Total Imports |
| Machine shops | $41.17 | $0.20 | $41.37 |
| Air and gas compressor manufacturing | $10.86 | $30.31 | $41.17 |
| Cement manufacturing | $40.90 | $0.26 | $41.16 |
| Cookie and cracker manufacturing | $4.96 | $34.84 | $39.79 |
| Grantmaking and giving and social advocacy organiz | $0.00 | $39.79 | $39.79 |
| Investigation and security services | $24.60 | $15.02 | $39.63 |
| Stone mining and quarrying | $37.65 | $1.96 | $39.61 |
| Nonchocolate confectionery manufacturing | $6.36 | $32.70 | $39.06 |
| Ice cream and frozen dessert manufacturing | $24.90 | $14.09 | $38.99 |
| Plastics pipe- fittings- and profile shapes | $38.17 | $0.32 | $38.48 |
| Pulp mills | $37.85 | $0.00 | $37.85 |
| Polish and other sanitation good manufacturing | $7.17 | $30.25 | $37.41 |
| Other miscellaneous chemical product manufacturing | $28.47 | $8.66 | $37.13 |
| Metal can- box- and other container manufacturing | $29.33 | $7.26 | $36.59 |
| Aluminum foundries | $36.41 | $0.16 | $36.57 |
| Relay and industrial control manufacturing | $32.26 | $4.20 | $36.46 |
| Sanitary paper product manufacturing | $10.58 | $25.81 | $36.39 |
| Dry- condensed- and evaporated dairy products | $10.10 | $26.08 | $36.18 |
| Other leather product manufacturing | $0.69 | $35.28 | $35.97 |
| Animal- except poultry- slaughtering | $21.05 | $14.25 | $35.30 |
| Other miscellaneous textile product mills | $15.06 | $20.08 | $35.14 |
| Motorcycle- bicycle- and parts manufacturing | $8.94 | $25.48 | $34.42 |
| Asphalt paving mixture and block manufacturing | $32.77 | $1.27 | $34.03 |
| Aircraft engine and engine parts manufacturing | $4.57 | $29.20 | $33.77 |
| Industrial and commercial fan and blower manufactu | $31.31 | $2.39 | $33.70 |
| Abrasive product manufacturing | $31.76 | $1.92 | $33.68 |
| Books printing | $32.93 | $0.37 | $33.29 |
| Scales- balances- and miscellaneous general purpos | $9.76 | $23.42 | $33.19 |
| Sign manufacturing | $4.44 | $28.57 | $33.02 |
| Hand and edge tool manufacturing | $17.26 | $15.49 | $32.76 |
| Heavy duty truck manufacturing | $0.05 | $32.58 | $32.63 |
| Other communications equipment manufacturing | $15.95 | $16.56 | $32.52 |
| General merchandise stores | $4.30 | $27.94 | $32.24 |
| Distilleries | $5.50 | $26.68 | $32.17 |
| Railroad rolling stock manufacturing | $11.87 | $20.27 | $32.14 |
| Reconstituted wood product manufacturing | $31.41 | $0.67 | $32.08 |
| Electric housewares and household fan manufacturin | $6.38 | $25.21 | $31.59 |
| Roasted nuts and peanut butter manufacturing | $15.14 | $15.45 | $30.59 |
| Motor vehicle body manufacturing | $28.08 | $2.25 | $30.32 |

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