THE ECONOMIC IMPACT OF THE RHODE ISLAND DEFENSE SECTOR

Rhode Island Defense Economy
Planning Commission

Newport County
Chamber of Commerce

JUNE 2014

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by

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Acknowledgments

The authors would like to thank Lisa M. Woodbury Rama, Public Affairs Officer at the Naval Station Newport, David Sanders, Public Affairs Officer at NUWC Division Newport, and Donna Murray and Kathleen Greenwell from the Rhode Island Department of Labor and Training, for their support and assistance with this project. Special thanks go to John Riendeau, Director of Business Development, Rhode Island Commerce Corporation, Molly Donohue Magee, Executive Director of the Southeastern New England Defense Industry Alliance (SENEDIA), Jody J. Sullivan, Executive Director of the Newport County Chamber of Commerce, and Keith Stokes, President of the Mayforth Group, for their advice, counsel, and expertise about the Rhode Island Defense Sector.

The Rhode Island Defense Economy Planning Commission and the Newport County Chamber of Commerce commissioned this report. It was funded by the Newport County Chamber of Commerce through a community service grant from the Rhode Island General Assembly.

Rhode Island Defense Economy Planning Commission

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EXECUTIVE SUMMARY

The Defense Sector plays a major role in the Rhode Island economy because of its unique ability to undertake large and small-scale basic and applied research and development projects and to push manufacturers to develop innovative products and revamp supply chains to meet production and/or distribution demands of civilian and military projects. This study estimates that in 2013 the Rhode Island Defense Sector, which includes the Military Defense Infrastructure and the Private Defense Industry (defense contractors):

- Supported 32,993 jobs (6.2 percent of total employment) in Rhode Island, from which 15,760 are direct jobs and 17,233 are indirect and induced jobs. The Private Defense Industry supported 16,119 jobs and the Military Defense Infrastructure supported 16,874 jobs in the state.
- Added $3.7 billion to the state's economic output, which represents 7 percent of the state's Gross Domestic Product. This figure includes $2.2 billion in direct output and $1.5 billion in indirect output.
- Created $1.9 billion in income for Rhode Island households. Direct earnings totaled $1.1 billion and induced earnings totaled $0.8 billion.
- Generated $105 million in tax revenues for the state of Rhode Island. This figure includes $47 million in personal income tax revenues and $58 million in other tax revenues.

DEFENSE SECTOR HIGHLIGHTS

- The Defense Sector is the highest paying sector in Rhode Island. In 2013, the average annual wage of civilian employees working for the Naval Undersea Warfare Center Division Newport (NUWC Division Newport) was $110,900; the average annual wage for all Rhode Island civilian employees working for the Department of Defense was $94,521; and the average annual wage of Rhode Island private defense industry workers was $72,361.
    - The average annual wage of NUWC Division Newport civilian workers was 155 percent higher than the average wage for Rhode Island non-farm employees ($43,489).
    - The average annual wage in the Rhode Island Private Defense Industry was 66 percent higher than the average wage in non-farm industries ($43,489), 47 percent higher than the average wage in manufacturing ($51,238), 95 percent higher than average wage in education and health services, and almost three times the average wage in the leisure and hospitality industry ($18,491).
- The Military Defense infrastructure employs a highly qualified civilian workforce. In 2013, 73 percent of the civilians working for NUWC Division Newport were classified in STEM occupations (science, technology, engineering, and mathematics) and 35 percent of all their employees held advanced academic degrees (master or PhD degrees).
- Students attending different training programs at the Naval Station Newport spend just under $46 million annually on local goods and services. A significant number of students also volunteer for local organizations including churches, schools, and the Rhode Island Blood Center.
- Every 100 jobs created in the Private Defense Industry supports 152 jobs -- via indirect and induced economic activity -- in other sectors of the Rhode Island economy.

THE ECONOMIC IMPACT OF

THE RHODE ISLAND DEFENSE SECTOR

INTRODUCTION

The Defense Sector plays a major role in the Rhode Island economy because of its unique ability to undertake large and small-scale basic and applied research and development projects and to push manufacturers to develop innovative products and revamp supply chains to meet production and/or distribution demands of civilian and military projects. In Rhode Island, the Naval Station Newport -- which hosts fifty Navy, Marine Corps, Coast Guard and US Army Reserve tenant commands and activities -- also hosts the Naval Undersea Warfare Center Division Newport, NUWC Division Newport, which is the US Navy's principal research, development, test and evaluation center for undersea weapons systems and many other systems associated with the undersea battlespace. The Naval Station Newport operates with and supports the work of the Department of Defense (DoD) private industry contractors.

In 2013, the DoD engaged in 4,768 transactions with more than 200 private defense contractors in Rhode Island, awarding a total of $712.7 million in contracts.[1] This figure includes contracts of $281 million to Raytheon Company, $57.4 million to Systems Engineering Associates (SEA) Corporation; $39.7 million to L-3 Communications Holdings Inc.; $20 million to McLaughlin Research Group; and $19.8 million to SAIC Inc. The DoD contracts support the development of new and disruptive technologies and products that serve defense and economic interests of the United States. The top products or services contracted include underwater sound equipment ($174.8 million), systems engineering services ($56.5 million), aircraft accessories and components ($34.7 million), and professional engineering, technical, and other support services ($124.8 million). Rhode Island also receives significant contract work from defense companies based in other states, including work performed by General Dynamics Electric Boat, a major employer in the state.

The purpose of this report is to measure the economic importance of the Rhode Island Defense Sector. Three metrics are utilized in this report: employment, earnings, and Gross Domestic Product (GDP). The contribution of the Defense Sector to the state's economy is not limited to the *direct* impact on output (GDP)[2], employment and earnings. The economic impact of the Defense Sector spreads to local businesses through direct purchases of goods and services from firms and service providers (defense contractors) including inputs, services, maintenance, repairs, etc. In addition, the Defense Sector's personnel spend their incomes and, thus, help to support the local and regional economies. Secondary effects on contractors' clients and on services that cater to the private defense industry are also accounted for in this study. This study measures the indirect and induced impact of the Defense Sector on the state's economy.

[1] This figure includes all DoD contracts by *place of performance*, which is defined by the Federal Procurement Data System as "the location of the principal plant or place of business where the items will be produced, supplied from stock, or where the service will be performed."

[2] GDP or output measures the market value of all goods and services produced by the defense industry within Rhode Island.

WHAT IS THE DEFENSE SECTOR?

Measuring the economic contribution of the Defense Sector is problematic because of the broad nature of the defense's economic impact and data limitations. In this study, the term *Defense Sector* is used to refer to total defense activities including the *Military Defense Infrastructure* and the *Private Defense Industry (*defense contractors). The Military Defense Infrastructure includes civilian employees operating under the umbrella of the Department of Defense, Coast Guard Personnel, Rhode Island National Guard personnel, and the active-duty military in the Army, Navy, Marine Corps, and Air Force. The Private Defense Industry is comprised of several NAICS (North America Industry Classification System) sectors that are identified as conducting defense related work. Table 1 summarizes the definition of the *Defense Sector* used in this study.

Table 1: The Rhode Island Defense Sector

Military Defense Sector
Department of Defense
Rhode Island Coast Guard
Rhode Island National Guard
Active Duty Military (Army/Navy/Marine Corps/Air Force)
Private Defense Industry (Defense Contractors)
All Other Fabricated Metal (includes small arms & ammunition) (NAICS 33299)
Search Detection, Navigational, Guidance, Aeronautical & Nautical System & Instrument Manufacturing (NAICS 334511)
Ship Building & Repair (NAICS 336611)
Scientific Research (physical, engineering, &life sciences) (NAICS 54171)
Engineering and Computer Systems Design Services (Part of NAICS 54151 and 54133)[a]
Other Defense-Related Activities
Defense Sector = Military Defense Infrastructure + Private Defense Industry

[a] Only defense-related activities in computer, mathematical, architecture, and engineering are considered.

An Overview of the Military Defense Infrastructure

In 2013 in Rhode Island, the Military Defense Infrastructure employed 11,106 people, from which 4,303 are civilians and 6,803 are duty station military personnel. The Department of Defense employs the majority of the federal civilians in the state. In addition, more than two-thirds of the defense civilians work at the Naval Undersea Warfare Center Division Newport, the Navy's premier research, development, test and evaluation engineering, and Fleet support center for submarine warfare systems, and other systems associated with the undersea battlespace. The military includes 303 Coast Guard personnel, 3,256 Rhode Island National Guard members, and 3,224 active-duty military in the Army, Navy, Marine Corps, and Air Force. While a large number of the military active duty and Rhode Island National Guard personnel are deployed overseas, their families spend their compensation on goods and services in Rhode Island and contribute to sales and employment

across all sectors of the state's economy. They also pay personal income tax and other taxes in Rhode Island.

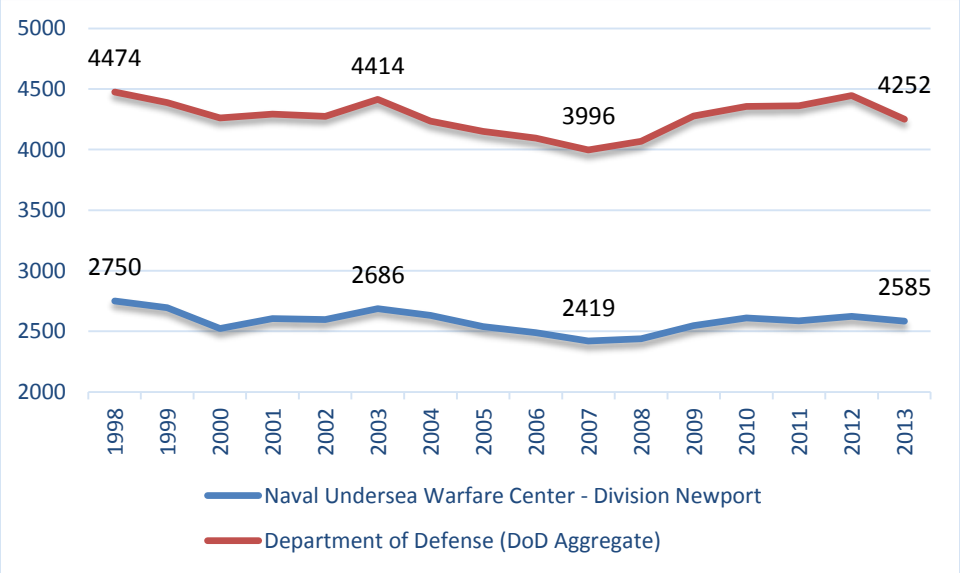
Table 2: Rhode Island Military Defense Infrastructure Personnel, 2013

	Civilians	Military	Total
Department of Defense (DoD)	3,851[a]	-	3,851
Coast Guard	51[b]	323[b]	374
Rhode Island National Guard	401[a]	3,256[c]	3,657
Active Duty Military (Army/Navy/Marine Corps/Air Force)	-	3,224[d]	3,224
Total Military Defense Infrastructure	**4,303**	**6,803**	**11,106**

Notes: [a] As of December 2013, U.S. Office of Personnel Management;
[b] U.S. Coast Guard (Available at http://www.uscg.mil/publicaffairs/statedatasheets/RHODE%20ISLAND.pdf;
[c] Rhode Island National Guard Annual Report 2013;
[d] As of August 2013, Defense Manpower Data Center (Available at www.governing.com).

The number of civilians working for the DoD *in Rhode Island*, including NUWC Division Newport, declined from a peak of 4,474 workers in 1988 to 3,996 workers in 2007. Since 2007, and after the recommendations of the 2005 Base Realignment and Closure (BRAC) Act were implemented, the number of civilians increased reaching 4,445 workers in 2012 and then dropping slightly to 4,252 in 2013 – in some part due to the Budget Control Act of 2011 and Sequestration that took effect in early 2013. It is important to note that the civilian personnel employed by NUWC Division Newport fluctuated in tandem with the total DoD civilian personnel, but most of the recent decline (2012-2013) in employment happened in other DoD units while NUWC Division Newport personnel stayed roughly constant.

Figure 1: Department of Defense Civilian Employees, Number of Jobs, 1998- 2013



Source: U.S. Office of Personnel Management.
Note: The figures above do not include civilians working for the Coast Guard.

The Military Defense Infrastructure contributed to the creation of $661 million in *direct* income for households in Rhode Island in 2013. The civilians employed by DoD earned a total of $364 million. Total wages and benefits for active military duty are estimated at $169.5 million. The Rhode National Guard added $106.3 million in income and the Coast Guard added another $21.1 million in income to the state economy.

Table 3: Rhode Island Military Defense Infrastructure, Direct Payroll, 2013

	$ (1,000)
Department of Defense[a]	364,001
Rhode Island Coast Guard[b]	21,149
Rhode Island National Guard[c]	106,286
Active Duty Military (Army/Navy/Marine Corps/Air Force)[d]	169,525
Total	**660,961**

Notes: [a] As of December 2013, U.S. Office of Personnel Management;

[b] The Coast Guard payroll figure is an *estimate* calculated as the product of the US Coast Guard operating expenses in the state of Rhode Island ($35.8 million) times the Coast Guard national average share of payroll to total operating expenses (for both military and civilians personnel);

[c] The National Guard payroll figure includes both federal and state wages and salaries paid to civilian and military personnel. Source: Rhode Island National Guard Annual Report 2013.

[d] This is an *estimate* calculated using the 2013 **basic pay** scale (average of 14 years of service) and the national distribution of personnel by rank. It also includes the national average allowances for *housing* and *other personnel benefits*. This estimate is conservative because the distribution of personnel at the Naval Station Newport is skewed toward mid-career to senior officers.

In Rhode Island, the Military Defense Infrastructure employs a highly qualified civilian workforce. In 2013, 73 percent of the civilians working for NUWC Division Newport were classified in STEM occupations and 35 percent of all workers held advanced academic degrees (master or PhD degrees). In addition, the total workforce of the Department of Defense in Rhode Island is comprised of 47.7 percent of STEM occupations, 66.1 percent of workers with a bachelor or advanced degree (master/PhD) and 29 percent of workers with a master or PhD degree.

Table 4: Qualification of the Department of Defense Civilian Employees, 2013

	Civilian Employment	**STEM Occupations[a]**		**Bachelor+Advanced Degree**		**Master / PhD Degree**	
	Count	Count	%	Count	%	Count	%
Rhode Island National Guard	401	43	10.7%	62	15.4%	13	3.2%
Department of Defense	102	5	4.9%	41	40.2%	22	21.6%
The Navy	3,749	1,982	52.9%	2,734	82%	1,196	31.9%
Naval Undersea Warfare Center Division Newport[b]	2,585	1,887	73%	2,120	82%	905	35%
Military Defense Infrastructure[c]	**4,252**	**2,030**	**47.7%**	**2,807**	**66.1%**	**1,231**	**29.0%**

Source: As of December 2013, U.S. Office of Personnel Management.

[a] STEM is an acronym referring to science, technology, engineering, and mathematics.

[b] NUWC Division Newport provided the STEM occupations and educational attainment data.

[c] This figure does not include Coast Guard Personnel.

Student Population at the Naval Station Newport

Newport has grown into a world-class center of learning excellence. The Naval Station Newport's facilities and infrastructure support the training and development of the Navy's midshipman candidates, senior enlisted personnel, officer candidates, and senior officers. It hosts more than 30 Naval Educational Programs. Examples include the Naval War College, Naval Justice School, Naval Supply Officer School, Command Leadership School, Naval Academy Preparatory School, Strategic Studies Group, Officer Training Command, Senior Enlisted Academy, Surface Warfare Officers School, and Defense Institute of International Legal Studies.

The number of Navy students in Newport varies on a yearly basis with the annual throughput ranging from about 9,600 to 15,000.[3] Table A1 in the appendix provides a list of programs offered at the different schools at the Naval Station Newport. It also provides the student breakdown by program, class size, and number of classes per year. The student annual throughput is estimated at 9,659 and the student average on board at 1,610. The Naval Station Newport also receives students for a relatively short period (e.g. to attend conferences) who are not accounted for in this figure.

A survey targeting students at the Naval Station Newport was utilized to produce information about their spending pattern and to measure the economic contribution of the student population to the local economy. The survey includes questions about spending on housing rents, local grocery stores, restaurants, transportation, movie theaters, entertainment establishments, and other expenses. It also asked students about the number of accompanying family members and visitors who might come to Newport to attend graduation ceremonies. Summary statistics and details about the calculation of students' spending are provided in Appendix C.

This study estimates that on an annual basis, students at the Naval Station Newport spend just under $46 million on local goods and services. This figure includes spending in grocery stores, restaurants, transportation, movie theaters, entertainment, and housing rents. It also reflects purchases of large items including computers, furniture, and cars. This spending indirectly contributes to support jobs and create income in Rhode Island. An estimate of these indirect effects is provided in the next section of this report.

An Overview of the Private Defense Industry

Most of the work performed by the Rhode Island Private Defense Industry is driven by contracts awarded by the Department of the Navy and complement research and development conducted at the NUWC Division Newport. From a total of $712.7 million in DoD contracts in 2013, the Department of the Navy awarded $602 million, which represents 84.4 percent of all DoD contract spending in Rhode Island. Other agencies accounted for 15.6 percent of DoD contract awards including: $51.1 million by the Defense Logistics Agency – the DoD's logistics combat support agency; $18.5 million by the Department of the Army; $3.5 million by Defense Microelectronics

[3] The military INSTALLATIONS website (http://www.militaryinstallations.dod.mil) puts the student annual throughput at 14,653 and the student average on board at 2,068.

Activity (DMEA); $1.9 million by the Department of the Air Force; and $33.4 million by the DoD.[4] The DoD direct grants went to the Office of the Adjutant General, institutions of higher education, and for-profit and non-profit organizations in Rhode Island.

Rhode Island also receives significant contract work from defense companies based in other states, including work performed by General Dynamics Electric Boat, a major employer in the state. General Dynamics is a market leader in business aviation, combat vehicles, weapons systems and munitions, shipbuilding and marine systems, and mission-critical information systems and technology. In 2013**,** General Dynamics employed 2,522 workers at its Quonset Point facility in Rhode Island, which is engaged in the fabrication of Virginia Class Submarines.

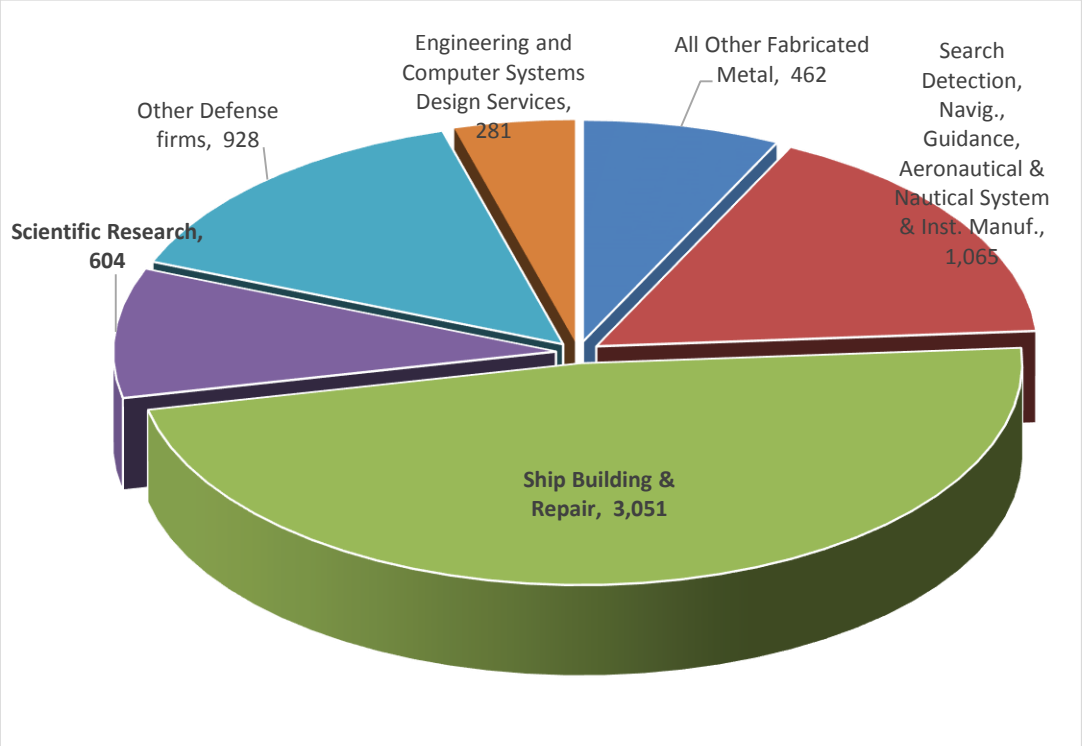
DoD contracts foster the integration of the Military Defense Infrastructure with the Private Defense Industry and support a significant number of jobs across several sectors of the Rhode Island economy. According to estimates from the Rhode Island Department of Labor and Training, the Rhode Island Private Defense Industry employed 6,391 workers in 2013. Figure 2 shows that *Ship Building and Repair*, the largest private defense sector, employed 3,051 workers, accounting for 47.7 percent of private defense employment in the state. The second largest defense industry is Search Detection, Navigation, Guidance, Aeronautical and Nautical System, and Instrument Manufacturing, with 1,065 workers (16.7 percent of employment). Scientific Research services employs 604 workers and engineering and computer systems design[5] employs 281 workers. Other defense-related activities, including fabricated metals, employ 1,390 workers.

In 2013, the Private Defense Industry contributed to the creation of $462.5 million in *direct* income for households in Rhode Island. In addition, the direct contribution of the Private Defense Industry to the state's Gross Domestic Product (GDP) is estimated at $947.6 million (see Appendix B for details about the output estimate).

[4] The dollar figures do not add up to $712.7 million due to possible omissions in the aggregation for departments.

[5] The employment count for Engineering and computer systems design services includes only jobs in defense-related business classified in NAICS codes 54151 and 54133 (or SIC codes: 7371, 7373, 8711, 8731, 8733, and 8748). Some companies that perform engineering and computer systems design services for the DoD have other primary NAICS designation, thus they are included in "Other Defense firms" and in other NAICS considered in this study.

Figure 2: Rhode Island Private Defense Industry, 2013



Source: Rhode Island Department of Labor and Training.

The Total Direct Impact of the Defense Sector

Table 5 summarizes the *direct* impact of the Defense Sector on employment, earnings, and output in Rhode Island. Overall, the Defense Sector directly supports 17,497 military and civilian workers (15,760 FTE) and adds $1.1 billion in earnings for the state. In addition, the direct contribution to the state's Gross Domestic Product (GDP) is estimated at $2.2 billion.

Table 5: The Direct Impact of the Rhode Island Defense Sector, 2013

	Employment	*FTE Employment*	*Earnings ($1,000)*	*Output ($1,000)*
Military Defense Infrastructure	11,106	9,369[a]	660,961	1,286,918[c]
Private Defense Industry[b]	6,391	6,391	462,460	947,610[c]
Defense Sector	**17,497**	**15,760**	**1,123,421**	**2,234,528**[c]

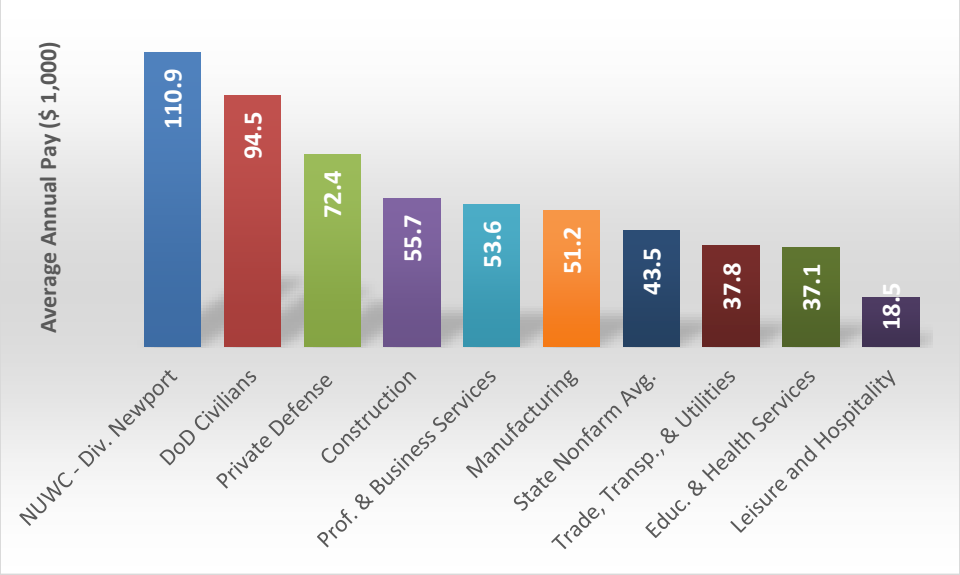
Notes: [a] The calculation of the FTE employment adjusts the R.I. National Guard military personnel by assuming that one-third of the military personnel are FTE and that two-thirds dedicate just one-fifth of their work time to the Rhode Island National Guard.

[b] Estimate provided by the Rhode Island Department of Labor and Training.

[c] Author's calculations using earnings figures from Table 5 and Final-Demand Earning RIMS multipliers produced by the Regional Product Division of the U.S. Bureau of Economic Analysis. See Appendix B for details about the output estimates.

The Defense Sector is the highest paying sector in Rhode Island, which through employment and high pay, contributes significantly to the state's economy. Defense Sector workers spend their wages on goods and services in Rhode Island and contribute to sales and employment across all sectors of the state's economy. In 2013, the average wage of civilian employees working for NUWC Division Newport was $110,900; the average wage for all Rhode Island civilian employees working for the Department of Defense was $94,521; and the average wage of Rhode Island private defense workers was $72,361. These figures are significantly higher than the average wage for non-farm workers in Rhode Island. More precisely, the average wage of NUWC Division Newport civilian workers was 155 percent higher than the average wage for non-farm employees ($43,489). In addition, the average wage in the Rhode Island private defense industry was 66 percent higher than the average wage in non-farm industries ($43,489), 41 percent higher than the average wage in manufacturing ($51,238), 95 percent higher than average wage in education and health services, and almost four times the average wage in the leisure and hospitality industry ($18,491).

Figure 3: Annual Average Wages, Rhode Island, 2013



Sources: U.S. Office of Personnel Management and U.S. Bureau of Labor Statistics.

THE INDIRECT AND INDUCED EFFECTS OF THE DEFENSE SECTOR

This study uses input-output (I-O) multipliers that are specific for the state of Rhode Island and produced by the U.S. Bureau of Economic Analysis (BEA) to account for inter-industry relationships within the state and to determine the *indirect* and *induced* impacts of the Defense Sector on the economy of Rhode Island.

Figure 4 provides a diagram illustrating the links and the method used to estimate the impact of the Defense Sector on the state economy. The Military Defense Infrastructure feeds the economy via two major channels: first, it directly employs active military and civilian personnel. The income created by the direct employment in defense-related activities is spent on local business and services, which stimulates the private sector and thus *induces* the creation of private jobs and income in the state. This also includes the effects of spending from students who attend one of the several programs offered at the Naval Station Newport. The second channel operates via the *direct* effect of the Military Defense Infrastructure on the Private Defense Industry (e.g. defense contractors) and the subsequent effects (*indirect effect*) from activities in the Private Defense Industry, which further stimulates the local economy via the purchase of goods and services from supporting business and service providers in the state. In addition, the income received by workers from the Private Defense Industry activities is spent on local business and services, which further stimulates the private sector and leads to the creation of private jobs and induced income in the state.

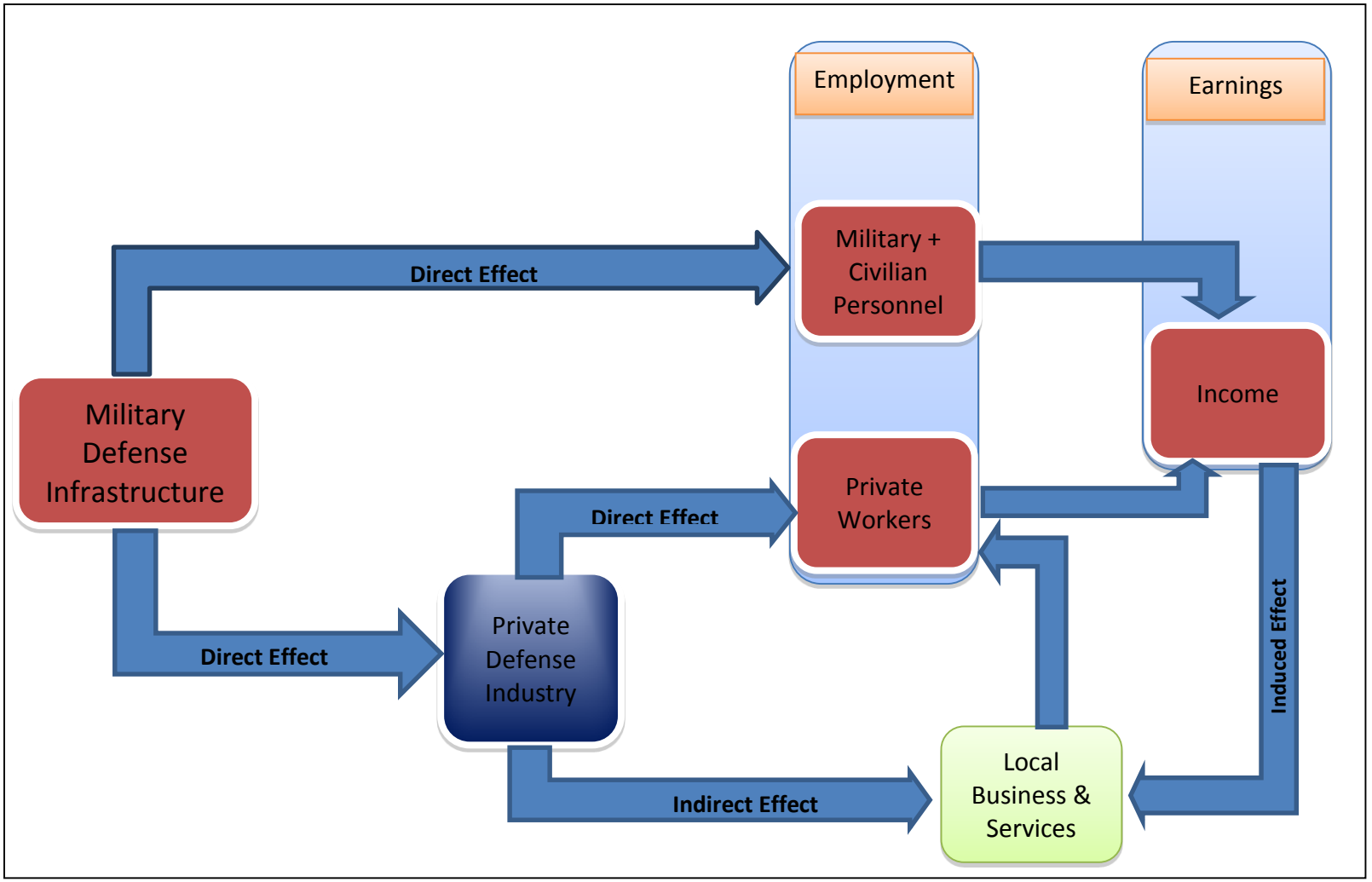
Direct impact: number of jobs, earnings, and output within the Defense Sector.

Indirect Impact: number of jobs, earnings, and output created throughout the supply chain (inter-industry) of the Defense Sector.

Induced effect: number of jobs, earnings, and output created by household spending of income earned either directly or indirectly from the Defense Sector.

Appendix D provides detailed information about the method utilized in this study to estimate the indirect and induced effects of the Defense Sector. Our calculation using data from the U.S. Bureau of Economic Analysis (BEA) show that the *earnings* multiplier for the Private Defense Industry is 2.03, which implies that each dollar of direct private-defense earnings generates another $1.03 in direct and induced earnings in the state. The *job* multiplier for the Private Defense Industry is 2.52, which implies that for every 100 jobs created in the Private Defense Industry, another 152 jobs are generated via indirect and *induced* economic activity in the Rhode Island economy. The *job-effect* multiplier for private defense is higher than the multipliers of manufacturing, finance and insurance, information, construction, health care and social assistance, real estate, rental and leasing, retail trade, and food, drinking, recreation, and accommodation.

Figure 4: The Defense Sector Economic Links



THE ECONOMIC IMPACT OF THE DEFENSE SECTOR

Table 6 summarizes the *direct* and *spillover* (indirect + induced) effect of the Defense Sector in Rhode Island. The figures below also reflect a conservative estimate of the induced contribution of Naval Station Newport students to the local economy.[6]

The Military Defense Infrastructure, which includes both civilians and active military, supported 16,874 jobs and contributed to the creation of $978.9 million in earnings in Rhode Island. The Private Defense Industry generated $940.8 million in earnings; $462.4 million in direct earnings and $478.4 million in indirect and induced earnings. It also supported 16,119 jobs, from which 6,391 jobs were direct and 9,728 were indirect jobs.

Overall, in 2013 the Defense Sector supported 32,993 jobs, which accounts for 6.2 percent of total employment in Rhode Island. It also contributed to create $1.9 billion in earnings across all sectors in the state, which represents 8.2 percent of all wages and salaries in Rhode Island.

Table 6: Defense Sector Employment and Earnings Impact, 2013

	Private Defense Industry		Military Defense Infrastructure		Defense Sector	
	Earnings ($1,000)	**Employment (FTE Jobs)**	**Earnings ($1,000)**	**Employment (FTE Jobs)**	**Earnings ($1,000)**	**Employment (FTE Jobs)**
Direct	462,461	6,391	660,961	9,369	1,123,422	15,760
Indirect + Induced	478,325	9,728	317,977	7,505	796,301	17,233
Total Impact	**940,784**	**16,119**	**978,938**	**16,874**	**1,919,722**	**32,993**

Source: Authors' calculations using multiplier data from the U.S. Bureau of Economic analysis and a myriad of data sources listed in the first section of this report.

In 2013, the Military Defense Infrastructure added $1.9 billion and the Private Defense Industry added $1.8 billion to the state's GDP. In all, the Defense Sector added an estimated $3.7 billion to the state's GDP, from which $2.2 billion was in direct output and $1.5 billion in indirect output. The Defense Sector supports 7 percent of the state's Gross Domestic Product.

Table 7: Defense Sector Output, 2013

	Output ($1,000)		
	Direct	**Indirect/Induced**	**Total**
Military Defense Infrastructure	1,286,918	647,423	1,934,341
Private Defense Industry	947,610	844,455	1,792,065
Total Impact	**2,234,528**	**1,491,878**	**3,726,406**

Source: Author's calculations using earnings figure from Table 5 and Final-Demand Earning RIMS multipliers produced by the Regional Product Division of the U.S. Bureau of Economic Analysis. See Appendix B for details about the output estimates.

[6] About 25 percent of the civilians working for NUWC Division Newport live in Massachusetts or Connecticut. To produce a conservative estimate, this study assumes that the same proportion of students at the Naval Station Newport live outside Rhode Island. Thus, the estimates are adjusted to account for students who might live in other states.

Tax Revenues

This study estimates the impact of the Defense Sector on personal income tax (PIT) and on "other taxes" revenues. In taking a conservative approach for PIT calculations, we assume that workers employed in defense-affected industries with an average salary under $30,000 would file as married (joint returns) and take the standard deductions ($16,000). Thus, this is the most conservative estimate for this income bracket. For all other sectors, the taxable income is calculated as the average wage for each sector times the share of the Adjusted Gross Income (AGI) that is taxable in Rhode Island for that income level as reported in the 2012 annual Rhode Island Statistics of Income, published by the Rhode Island Department of Revenue. It is also assumed that all *taxable* income is subject to a 3.75 percent rate. Overall, this set of assumptions is expected to produce the most conservative estimate of the impact of the Defense Sector on income tax revenues.[7]

This report uses a standard methodology to calculate "other tax" revenues. According to the U.S. Census *2013 Annual Survey of State Government Tax Collections*, in Rhode Island for every dollar collected in personal income taxes, individuals and corporations generate another $1.52 in *other tax* revenues. These revenues include general sales and gross receipts taxes (goods, alcoholic beverages, motor fuels sales tax, tobacco, etc.) and license taxes (alcoholic beverages license, amusements license, corporations in general license, motor vehicle license, motor vehicle operator's license, public utilities license, among other license fees).[8] However, not all workers supported by the Defense Infrastructure live in Rhode Island. According to a report[9] released by the Naval Station Newport, about 25 percent of the civilians working for NUWC Division Newport live in Massachusetts or Connecticut. We also assume that the same proportion of workers employed by the Private Defense Industry live outside Rhode Island.

Table 8 provides the tax revenues estimates. Under the assumptions above, in 2013 the Defense Sector supported the generation of $105 million in tax revenues for the state of Rhode Island. This figure includes $47 million in direct and indirect income personal income tax (PIT) and $58 in direct and indirect "other tax" revenues for the State of Rhode Island.

Table 8: Estimated Impact on Tax Revenues ($1,000), Rhode Island, 2013

	Private Defense Industry	Military Defense Infrastructure	Defense Sector
Personal Income Taxes	$23,616	$23,373	$46,989
Other Taxes	$31,483	$26,645	$58,128
Total	**$55,099**	**$50,018**	**$105,117**

Source: Authors' calculations.

[7] It is important to note that a proportion of workers directly or indirectly supported by the Defense Sector live in other states. However, all workers who receive income from a Rhode Island job have to pay income taxes in the state.
[8] This study excludes the following taxes from the calculations: Death and Gift Taxes, Documentary and Stock Transfer Taxes, and Severance Taxes.
[9] 2013 Economic Impact on Southern New England. NUWC Division Newport.

Disclaimer

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The author has exercised due and customary care in conducting this research and report. Every effort has been made to ensure the quality of the analysis. The author assumes no liability for any loss resulting from errors, omissions, or misrepresentations made by others.

Appendix A

Table A1 - Programs Offered at the Naval Station Newport Schools

Name	# Classes Per Year	# Students Per Class	# Students Per Year
Survival, Evasion, Resistance and Escape	23	62	1,426
Officer Development School	11	varies	1,392
Officer Candidate School	16	100	888
Senior Enlisted Academy	7	112	784
Prospective Commanding Officer	14	42	588
Leading Division Officer/Chief Warrant Officer	10	50	500
Maritime Staff Operators Course	16	28	448
Prospective Executive Officer	14	30	420
Naval Academy Preparatory School	1	325	325
College Naval Warfare/College Naval Command & Staff	1	300	300
Department Head	5	60	300
Supply Corps Officer Basic Qualifications	4	70	280
Command Master Chief/Chief of the Boat	14	18	252
Prospective Major Command Course	14	18	252
Supply Officer Department Head	6	35	210
Senior Officer Ship Material Readiness Course	5	40	200
Prospective Commanding Officer	4	40	160
Senior Officer Course	8	20	160
Advanced Engineering	5	30	150
Stock Control Supervisor/R-Supply	4	35	140
Legalman	3	35	105
Basic Lawyer Course	3	30	90
Naval Science Institute	1	75	75
Major Command	5	10	50
Senior Supply Officer Department Head	2	25	50
Special Missions Executive Officer/Commanding Officer	5	10	50
Littoral Combat Ship Officer of the Deck	9	4	36
Littoral Combat Ship Junior Officer of the Deck	6	4	24
PCO Shipboard Fundamentals	2	2	4
OCS SWO Intro	16	varies	NA
Total	**234**	**1,610**	**9,659**

Source: Naval Station Newport, May 2014.

Appendix B: Output Estimates

i. Direct effect

The GDP figure is estimated using earnings figures from Table 5 and Final-Demand *Earning* RIMS multipliers produced by the Regional Product Division of the U.S. Bureau of Economic Analysis (BEA). The following formula is utilized:

$$Output_{PDI} = \frac{Earnings_{PDI}}{M_{PDI}},$$

where *PDI* denotes Private Defense Industry, *earnings* is total earnings, and *M* is the final-demand earnings multiplier for the Private Defense Industry. According to figures from the BEA and the authors' calculation, *M* is equal to 0.488 for the Private Defense Industry. This figure represents the change in earnings that occurs for each additional dollar of output. Alternatively, the inverse of M (1/M=2.05) represents the output necessary to create each dollar in earnings.

A similar method is utilized to calculate the direct output of the Military Defense Infrastructure. According to figures from the BEA and the authors' calculation, *M* is equal to 0.514 for the Military Defense Infrastructure. This figure implies that $1.95 in output is necessary to generate $1 in earnings in the Military Defense Infrastructure.

ii. Indirect and Induced effect

The indirect output impact from the Private Defense Industry is estimated using the Final-Demand *Output* RIMS multipliers produced by the Regional Product Division of the U.S. Bureau of Economic Analysis (BEA). The following formula is utilized:

$$I_{PDI} = M_j * Output_{PDI}$$

where *I* denotes the *indirect* output supported by the Private Defense Industry, *j* denotes all industries affected by the Private Defense Industry, *M* is the final-demand output multiplier for industry *j*, and $Output_{PDI}$ is the direct output of the Private Defense Industry.

A similar method is utilized to calculate the indirect output of the Military Defense Infrastructure. To avoid double counting, however, this study excludes the inter-industry effects by subtracting the Multiplier Type I impact from the Multiplier Type II impact. This allows separating the inter-industry and household-spending effects. In addition, the induced contribution of Naval Station Newport students is added to this figure. This method produces an estimate only of the *induced* impact of the Military Defense Infrastructure on output.

Appendix C: Naval Station Newport Student Survey

The number of Navy students in Newport varies on a yearly basis with the annual throughput ranging from about 9,600 to 15,000. A survey targeting students was utilized to produce information about their spending pattern and to measure the economic contribution of the student population to the local economy. The survey includes questions about spending on housing rents, local grocery stores, restaurants, transportation, movie theaters, entertainment establishments, and other expenses. It also asked students about the number of accompanying family members and visitors who might come to Newport to attend graduation ceremonies.[10]

From 119 completed surveys, 101 are from the Naval War College, 10 are from the Surface Warfare Officers School Command, 4 are from the Officer Training Command Newport, 2 are from the Naval Justice School, and 2 are from the Navy Supply Corps School. Table C1 provides monthly averages for several spending categories by school. It is worth noting that 30 percent of the participants in the survey bought a car and 39 percent made major purchases (computer, furniture, etc.) when they joined the Naval Station Newport for their studies. In addition, 34 percent of the students surveyed expect to have relatives and friends attending their graduation ceremonies and that the visitors will stay in local hotels for at least one night. Also, 39 percent of the survey respondents volunteered for a local organization, including volunteer work for churches, schools, and the Rhode Island Blood Center.

Table C1: Monthly Average Local Spending, Students at the Naval Station Newport, 2014

School	Restaurants, movie theater, bars and clubs	Grocery Stores	Transportation	Other Expenses	Total Spending	Rents
Naval Justice School	78	255.0	80	55	468	NA
Naval War College/Navy Supply Corps School	313	508.4	146	285	1,252	2,218
Officer Training Command Newport	148	182.5	93	135	558	1,293
Surface Warfare Officers School Command	545	565.0	169	290	1,569	1,621

Source: Authors' tabulation using data from own survey.

The estimate of the total annual spending of students on the local economy is calculated using data from Table C1 together with the number of students per school and length of the programs at the Naval Station Newport (Appendix C1). It is also assumed that that the spending pattern of students in the Surface Warfare Officers School Command and Command leadership school (for which there were no respondents) was equal to the average of spending from students attending the Naval War College and Surface Warfare Officers School Command. In addition, this study also assumes that:

- students who attend the Naval Academy Preparatory School spend a total of $150/month;

[10] Upon request, the authors will be happy to provide a copy of the survey.

- students from the Survival, Evasion, Resistance and Escape program do not spend any money on the local economy;
- 30 percent of officers who attend programs lasting more than 3 months buy a car;
- 39 percent of students who attend programs lasting more than 2 months make major purchases including computers and furniture;
- 34 percent of students who attend programs lasting more than 3 months have relatives and friends who attend their graduation ceremonies and these visitors stay in local hotels for an average of two nights. The Providence Warwick Convention and Visitors Bureau estimates an average hotel fare of $137.66/night.

Considering the assumptions above, this study estimates that on an annual basis, students at the Naval Station Newport spend just under $46 million on local goods and services. This figure includes spending with grocery stores, restaurants, transportation, movie theaters, entertainment, and housing rents. It also reflects purchases of large items including computers, furniture, cars, and spending at local hotels.

Appendix D: Direct and Induced Impact

Multiplier analysis is based on the notion of feedback through input-output linkages among the Defense Sector, other organizations, businesses, and households that interact in regional markets. The economic impact of the Defense Sector spreads to local businesses through direct purchases of goods and services from firms and service providers (military contractors) including inputs, services, maintenance, and repairs. Secondary effects on Private Defense Industry clients and on services that cater to defense-sector workers are also reflected in this study. More precisely, the Defense Sector impacts local businesses via the multiplier effect working through the economy as purchases of locally produced goods and services arising from the income created by employment in defense-related activities.

This study measures the economic impact of the Defense Sector using *multipliers* that are specific for the state of Rhode Island and produced by the U.S. Bureau of Economic Analysis (BEA). This study uses BEA RIMS Type I and II multipliers because they include both the *inter-industry* effect and *household-spending effect*. Type I multipliers account for the *inter-industry* effect, which is the sum of the *direct* and *indirect* impact: The *direct impact* relates to the first round of inputs purchased by the Defense Sector. The *indirect impact* relates to the subsequent rounds of inputs purchased by supporting industries. The BEA RIMS Type II multiplier accounts for both the *inter-industry* and the *household-spending effect*. The latter is called the *induced effect* and measures the impact on the local economy from the spending of all workers whose earnings are affected by the Defense Sector. Hence, this study accounts for both the *inter-industry effect* and for the *induced impact* of the defense sector.

To avoid double counting, this study estimates the multiplier effect using a two-step process. The first step excludes the inter-industry effects and measures only the *induced effect* from income created directly by the Military Defense Infrastructure on local business and services. Our methodology consists of subtracting the Type I impact from the Type II impact, which allows separating the inter-industry and household-spending effects. More precisely, the outcome of subtracting the Type I impact from the Type II impact produces an estimate of the household-induced impact and, thus, excludes any inter-industry effects from the estimates.

Table D1 provides the estimates of the Military Defense Infrastructure induced effect in Rhode Island. The estimates in the *Earnings Column* imply that for every dollar paid to military and civilian personnel, another $0.458 in earnings is generated via *induced* economic activity in the Rhode Island economy. The estimates in the *Employment Column* imply that for every 100 workers *directly* employed in the Military Defense Infrastructure, another 74 jobs are generated via *induced* economic activity in Rhode Island. The *Output Column* implies that for every dollar of output created in the Military Defense Infrastructure, another $0.456 in *induced* output is generated in other industries in Rhode Island. It is important to note that these estimates exclude the inter-industry impact (including the private defense industry), which is discussed below.

Table D1: The Military Defense Sector Induced Effect

Multiplier Type	Earnings	Employment	Output[b]
Type I[a]	1.5335	1.7634	1.516
Type II[a]	1.9912	2.5088	1.972
Induced Effect	**0.4577**	**0.7454**	**0.456**

Note: The multipliers are for *Government Enterprises*, which includes all federal government activities in the state.
[a] Source: RIMS multipliers from the Regional Product Division of the U.S. Bureau of Economic Analysis.
[b] Details about the estimates of the output effect is provided in Appendix B.

The second step measures the inter-industry (or indirect) and the induced effects from the Private Defense Industry. Table D2 reports the RIMS Type II employment multipliers for the Rhode Island Private Defense Industry and its sub-sectors. The *earnings* multiplier (Column A) measures the total impact on earnings for each dollar paid to private defense workers. The *earnings* multiplier for the Private Defense Industry 2.03, which implies that each dollar of direct private-defense earnings generates another $1.03 in direct and induced earnings in the state. Column B shows the *job* multiplier, which measures the total number of jobs created in all Rhode Island industries for each job created in a particular industry. The *job* multiplier for the Private Defense Industry is 2.52, which implies that for every 100 jobs created in the Private Defense Industry, another 152 jobs are generated via indirect and *induced* economic activity in the Rhode Island economy. The *job-effect* multiplier for private defense is higher than the multipliers of manufacturing, finance and insurance, information, construction, health care and social assistance, real estate, rental and leasing, retail trade, and food, drinking, recreation, and accommodation.

Table D2: Private Defense Industry Multipliers

	Earnings (A)	Employment (B)
Private Defense Industry	**2.03**	**2.52**
All Other Fabricated Metal (includes small arms & ammunition) (NAICS 33299)	1.89	1.90
Search Detection, Navigation, Guidance, Aeronautical & Nautical System & Instr. Manuf. (NAICS 334511)	2.00	3.28
Ship Building & Repair (NAICS 336611)	2.16	2.44
Scientific Research (physical, engineering, &life sciences) (NAICS 54171)	1.74	2.20
Defense-Related Engineering Services (Part of NAICS 54133)	1.77	2.32
Defense- Related Computer Systems Design (Part of NAICS 54151)	1.60	2.26
Other Defense-Related Activities	1.95	2.45

Source: RIMS multipliers produced by the Regional Product Division of the U.S. Bureau of Economic Analysis.