DEFENSE SPENDING AND THE STATE ECONOMY: THE IMPACT OF FEDERAL DEFENSE SPENDING ON STATE LEVEL UNEMPLOYMENT AND PER CAPITA PERSONAL INCOME

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By

Robert Lewis Schneider, B.A.

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Robert Lewis Schneider, B.A.

Thesis Advisor: Andrew Wise, Ph.D.

ABSTRACT

Annually accounting for the largest portion of federal discretionary appropriations, many Members of Congress and industry stakeholders argue that expenditures from the Department of Defense are a significant driver of the economy at both the national and local level. Based on this observation, I examine the impact of federal defense spending on the economy at the state level. Specifically, I test the hypothesis that federal defense spending is associated with lower unemployment rates and higher levels of per capita income. Using federal defense spending data provided by the U.S. Census Bureau’s Consolidated Federal Funds Report (CFFR) for every five years between 1990 and 2010, I find that my hypothesis is partially supported. While defense spending is associated with decreases in unemployment, it is also associated with decreases in per capita income levels. Conversely, non-defense spending is associated with increases in unemployment, but decreases in per capita income. At the same time, per capita defense and per capita non-defense funding are both associated with increased unemployment and increased per capita income levels. To further assess these inconsistencies, I examine the impact of population on defense and non-defense funding received by a state and find that increases in population are associated with increases in the defense and non-defense funding received by a state. I conclude that while defense spending may have a minor, though positive impact on the state economy, it is likely that the distribution and real economic impact of both federal defense and non-defense funding is a result of state population levels.
To my family and friends for their unwavering support and my advisor Andrew Wise for his expert guidance throughout this process.

Many thanks,

Bob
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I. Introduction

The purpose of this study is to examine the impact of Department of Defense spending on key state level economic indicators. Specifically, I investigate annual federal defense expenditures in five year increments from 1990 to 2010 to see if higher or lower levels of federal defense dollars spent in each state is associated with higher or lower average annual unemployment rates and per capita personal income. While previous studies focus on the national level impact or the state level impact immediately following the Vietnam War, this study examines the positive and negative impacts of higher or lower defense spending during a twenty-year span that includes years of relative peace, military conflict, and in both a flourishing economy and an economy before and during the worst economic collapse since the Great Depression. My hypothesis is that states receiving a larger share of federal defense expenditures will on average have lower unemployment rates and higher per capita personal income than states receiving a smaller share of federal defense expenditures.

Largely traced back to President Harry Truman’s approval of National Security Council Report 68 (NSC-68) and the Korean War, the Defense Department is annually the largest recipient of discretionary spending by the federal government. With the development of the military industrial complex, federal defense dollars have become deeply integrated into the economy of many states. Because the Defense Department provides funding to military installations, defense companies, private businesses, universities, and salaries and wages to both military and civilian personnel, along with many other funding recipients, states claim to have become increasingly reliant on Department of Defense funding as a mechanism for positive economic activity.

As a result, state and local governments, Members of Congress, and members of the military industrial complex, most noticeably the largest defense companies who have successfully
rooted themselves in nearly every congressional district around the country, have led Americans to believe that defense funding can act as an economic stimulus for the local economy. Even more so than funding for education or transportation and infrastructure, there is a perception that it is crucial that a community receive defense expenditures in order for future or continued economic growth. While previous studies demonstrate, (and common sense would lead one to believe) that there is a connection between defense spending and economic health, policymakers need to be cautious of a growing narrative that defense spending can be used as an economic stimulus. If this study reveals that increased defense spending may lead to lower state level unemployment rates and higher personal income levels, this does not mean I will recommend policymakers should increase defense spending.

With this study I hope to add to the longstanding discussion regarding the trickle-down impact of federal defense spending and to urge policymakers in their debates regarding funding for both national security and domestic priorities to consider the potential intended and unintended impacts of their decisions.

This paper is organized as follows. In the next section I provide background information, including an explanation of the federal budget process and the origins of the massive increase in defense spending. I also summarize processes and conclusions from related studies on the impact of federal spending, both defense and non-defense, on the national and state level economy. Section III provides a theoretical framework based on the information presented in Section II. Section IV is a discussion of the data I use in the empirical model that I introduce in Section V. I discuss my results in Section VI, followed by a conclusion in Section VII, which also includes a discussion of policy implications and my recommendations for future policy. Lastly, I include a list of references used to conduct this study and prepare this paper.
II. Background and Related Literature

In this section, I provide background on the federal budget process and the growth of federal defense expenditures, explore the variation between different states’ reliance on defense expenditures as part of their economy, and discuss previous literature and studies on the impact of defense spending on the national economy as well as regional and state economies.

The Federal Budget Process

Although a formal framework for setting the budget for the United States was established as part of the Congressional Budget Act of 1974, the process is seldom followed. By law, the President is supposed to annually submit a budget request for the following fiscal year, which begins on October 1, to Congress no later than the first Monday in February. After holding committee hearings and a review of the President’s budget request, Congress must pass a concurrent budget resolution, committing itself to broad spending and revenue levels by April 15. Between April 15 and September 30, Congress theoretically is required to complete action on and the President must sign the twelve appropriations bills in order to avoid a government shutdown; a situation in which the government closes as a result of there being no agreement on how much federal money is appropriated and where it is allocated to.

Unfortunately, Congress frequently misses these deadlines and the last time Congress enacted all twelve appropriations bills on time was 1996. Many times, Congress has passed a continuing resolution, simply extending the previous year’s funding levels for another fiscal year. More recently, Congress and the President have agreed on multi-year budget agreements and enacted all twelve appropriations bill as one piece of legislation, often referred to as an “omnibus”
appropriations bill. For example, for the Fiscal Year 2016, Congress was unable to pass any individual appropriations bill, so instead all twelve bills were combined and passed as H.R. 2029, the Consolidated Appropriations Act, 2016.¹

But appropriation bills only cover “discretionary” spending, or spending on programs established by laws that leave Congress with the discretion to set the funding levels each year. Not included in discretionary spending is “mandatory” spending. Mandatory spending includes the three largest entitlement programs (Medicare, Medicaid, and Social Security), as well as Supplemental Nutrition Assistance Programs (SNAP)², unemployment insurance, and veterans’ disability benefits, among other programs.³

**Funding for the Department of Defense**

Included in and accounting for by far the largest percentage of discretionary spending is funding for the Department of Defense. Between 1990 and 2010 the Department of Defense never accounted for less than 44.7 percent of discretionary spending, and at its peak in 1990 accounted for nearly 59.1 percent of discretionary spending.⁴

During fiscal year 1990, the Defense Department spent nearly $377 billion (in 2010 dollars). Over 20 years, through various times of war, peace, heightened conflict, economic surplus and economic recession, that number grew to nearly $557 billion in 2010. Below is a table showing the total federal expenditures for the Defense Department for the years included in my data.
Table 1: Federal Expenditures (2010 dollars) for the Defense Department FY 1990-2010

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Federal Defense Expenditures (millions of dollars)</th>
<th>Per Capita Federal Defense Expenditures (dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>376,716</td>
<td>1,493</td>
</tr>
<tr>
<td>1995</td>
<td>324,198</td>
<td>1,227</td>
</tr>
<tr>
<td>2000</td>
<td>301,662</td>
<td>1,080</td>
</tr>
<tr>
<td>2005</td>
<td>417,804</td>
<td>1,375</td>
</tr>
<tr>
<td>2010</td>
<td>556,959</td>
<td>1,773</td>
</tr>
</tbody>
</table>

*Data from the U.S. Census Bureau’s Consolidated Federal Funds Report.\(^5\)

While the actual amount spent by the Defense Department increased year-over-year, the amount in 2010 dollars actually decreased between 1990 and 2000 under President Bill Clinton. But after the events of September 11, 2001 and the subsequent wars in Afghanistan and Iraq under President George W. Bush, the Defense Department’s expenditures increased nearly 185 percent between 2000 and 2010. Furthermore, these figures only represent a fraction of actual defense expenditures. They do not include spending on most intelligence agencies, Overseas Contingency Operations (OCO) funding from the Defense Department and State Department and any spending deemed classified by the Defense Department.

The expansion of and attention to the federal defense budget can largely be traced back to the decade following World War II. It was clear the United States had an advantage on the international stage, but the Soviet Union was closing the gap. Issued on April 14, 1950, National Security Council Report 68 (NSC-68) was meant to be a reexamination of the United States’ objectives during times of war and peace moving forward. While President Harry Truman had just released a budget that capped American military expenditures around $13 billion (in 1950 dollars, nearly $119 billion in 2010 dollars), the report called for spending far beyond this number, estimated by the report’s main author, Paul Nitze, and Secretary of State Dean Acheson to
potentially be as high as $40 or $50 billion. Initially skeptical of NSC-68’s implications and costs, President Truman asked for further analysis of the report, but with the June 1950 attacks in Korea and the start of the Korean War, President Truman approved NSC-68’s conclusions in September 1950 and a dramatic expansion of the Defense Department and the defense budget ensued.

The Defense Budget and the National Economy

In the decades since NSC-68 and the Korean War, states have become increasingly reliant on federal defense expenditures for supporting economic activity. Considering the defense budget makes up such a large portion of the total federal budget, it would make sense that the defense budget therefore provides a significant positive impact on the economy. For obvious reasons, this theory is largely pushed by the defense industry. If this scenario sounds familiar, it is precisely the situation President Dwight Eisenhower warned Americans of in his farewell address to the nation on January 17, 1961.

We annually spend on military security more than the net income of all United States Corporations. This conjunction of an immense military establishment and a large arms industry is new in the American experience. The total influence – economic, political, even spiritual – is felt in every city, every State house, every office of the Federal government. We recognize the imperative need for this development. Yet we must not fail to comprehend its grave implications. Our toil, resources and livelihood are all involved; so is the very structure of our society. In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex.

Despite President Eisenhower’s best efforts, the military-industrial complex has deeply rooted itself in the economy of the country, states, towns, and most importantly, congressional districts. Since the defense industry benefits from continued growth of the defense budget, companies continuously praise the economic benefits of defense dollars to Americans, a tactic former Assistant Secretary of Defense for Manpower, Reserve Affairs, Installations and Logistics
Lawrence Korb calls “Gunpoint Stimulus.” Korb has long argued (Korb and Merighi 2009, Korb et al. 2009 and Korb et al. 2012) that while the pure size of the defense budget means it has a positive impact on the economy, studies have shown that defense spending creates far fewer jobs per billion dollars than other forms of government spending (Pollin and Garrett-Peltier 2007/2011). It appears that there is an effective way to use the defense budget to positively impact the economy, but the answer may not be to simply increase the Defense Department’s share of the discretionary budget.

**The Defense Budget and the State Economy**

At the same time that the defense budget drastically increased during the early 21st century, many states made defense related sectors paramount to the economic make-up of their state. Not coincidentally, Members of Congress have increasingly lobbied for companies, projects and military bases that will bring defense expenditures, in the form of direct investment, procurement, and salaries and benefits to their districts and states. According to the U.S. Census Bureau’s 2005 Consolidated Federal Funds Report, California received the greatest share of Defense Department expenditures at 12.1 percent, or $45.1 billion and Wyoming received the least, at 0.1 percent or $486 million. Furthermore, the top nine states in terms of percent distribution of federal defense expenditures in 2005 received nearly 52 percent of all federal defense expenditures that year.

That same year, a study in the Commonwealth of Massachusetts, which received 2.5 percent of federal defense expenditures in 2005 (nearly $9.5 billion), found that defense industry production and spending on salaries for military personnel and retires generated $9.2 billion in direct impacts in the state. This led to an additional $5.5 billion in indirect and induced impacts, supporting 114,560 jobs. Clearly, there is a large disparity in the amount of Defense Department
expenditures received by state and therefore a large disparity in the dependence of a state and its economy on defense funding. For this reason and based on previous research (Hooker and Knetter 1997, Borch and Wallace 2010), I chose to study the impact of federal defense department expenditures at the state level, rather than at the national level.

**Impact at the National Level**

While there have been many studies on the impact of increases and decreases in defense spending on economic indicators at the national level (Abell 1994, Adams and Gold 1987, Heo 2010, Pollin and Garrett-Peltier 2007/2011) including the use of federal defense spending as an economic stimulus and studies of the war time economy, many of these reports note that to get a better picture of the relationship between defense spending and economic growth, studies at the state level are required. Still, it remains important to understand the impact of defense spending at the national level before further concentrating on the impact at the state level.

Gordon Adams and David Gold (1987) provide an overview of previous studies on the impact of defense spending on the economy since World War II. They argue that it is likely that both critics and supporters of increased defense spending as a means of economic stimulus are overstating the positive or negative impact on the economy. They further note that while historic studies of the relationship between defense spending and employment vary, they conclude that defense spending is not sufficient to explain the characteristics of the U.S. economy since the end of World War II and that to calculate the true impact of defense spending, there needs to be a study at the regional level to account for different sectors of the economy and segments of the labor force.
John Abell (1994) studies the impact of defense spending on income inequality in the post-Vietnam era. Using military spending, non-military spending, marginal tax rates, inflation, and either interest rates or economic growth, Abell finds that military spending is associated with increased income inequality in the post-Vietnam era. He concludes that this is likely a result of the tendency for military jobs to pay better than civilian work and the profitably of military related contracts relative to commercial production.

More recently, in 2007, Robert Pollin and Heidi Garrett-Peltier of the University of Massachusetts Political Economy Research Institute study the impact on national employment of spending $1 billion on defense and $1 billion on other domestic programs including personal consumption, health care, education, mass transit, and construction for home weatherization and infrastructure. They conclude that generally $1 billion spent on domestic programs will create more jobs within the U.S. economy than the same $1 billion spent on the military. More specifically, while spending on personal consumption produces generally poor-paying jobs, more so than $1 billion to the military would, spending on education creates a higher number of jobs and a higher average pay than spending on defense. The results for other sectors (health care, infrastructure, mass transit) were less clear since more jobs will be created than with military spending, but the average pay will be lower. In a 2011 update to their study, Pollin and Garrett-Peltier add the impact of spending on clean energy programs and cutting taxes, which should produce increased levels of personal income. They find that $1 billion spent on each of the domestic spending priorities (clean energy, health care and education) as well as tax cuts will create substantially more jobs within the U.S. economy than would the same $1 billion spent on the military. Furthermore, the increased job creation from investments in these domestic programs carries across all pay ranges.
Lastly, Uk Heo (2010) uses multiple economic models to study the relationship between defense spending and economic growth in the United States. He concludes that defense spending does not significantly affect the U.S. economy, but recommends that since defense budget allocations are directed toward a small number of states, further studies at the state level are required to understand the true relationship.

**Impact at the State Level**

Those who have studied the economic impact of defense expenditures at the state and regional level (Mehay and Solnick 1990, Hooker 1996, Hooker and Knetter 1997, Gius 2006, Borch and Wallace 2010, Owyang and Zubairy 2013, Horvath et al. 2014) generally find that states that have come to rely on industries deeply entrenched in the military-industrial complex face significant positive and negative consequences from changes in federal defense expenditures.

Stephen Mehay and Loren Solnick (1990) study the effects of defense spending on state personal income and on manufacturing employment. They find that between 1976 and 1985 aggregate defense spending has a positive impact on both personal income and employment in manufacturing at the state level. They do note that when defense spending is broken down to investment spending versus operating expenses, only investment spending appears to impact state economic growth consistently.

Mark Hooker (1996) concludes that military spending significantly affects economic activity at the state level with increases in military spending leading to increases in personal income and employment. Further there is at least a modest impact on most states and a sizable impact on those with large exposure to the military sector. Specifically, he finds that large decreases in military spending have large impacts on state employment growth, but only on the
most dependent states. At the same time, small increases or decreases in overall defense spending have smaller and less precisely estimated impacts.

Hooker later joins Michael Knetter (1997) to study the effects of military spending, specifically state procurement spending, on economic activity. They find evidence that state employment growth rates respond to changes in procurement spending. Large decreases in military spending have large and significant impacts, while small changes and large increases in military spending have essentially no impact.

Mark Gius (2006) studies the impact of government spending broadly on employment and output at the state level between 1980 and 2000. He finds that both state and federal government spending increase per capita state output and employment. Interestingly, his regression calculates a negative and statistically significant coefficient on defense spending. He concludes that the negative coefficient indicates that states that obtain a larger share of federal defense spending have lower per-capita output and lower employment.

Casey Borch and Michael Wallace (2010) study the impact of military spending on the economic well-being of states in the post-Vietnam era, which they associate with a permanent war economy in the United States. They cite Hooker and Knetter’s (1997) study at the state level because they believe state level data has more power to identify a relationship between defense spending and economic activity. Further, they argue that states offer a range of economic, social and political conditions to study while still sharing the geopolitical constraints of the U.S. permanent war economy. They find that states with high levels of military spending are better equipped to deal with the negative effects of economic recession than are states with lower levels of military spending. States that receive larger shares of federal defense expenditures have lower poverty rates, less income inequality, lower unemployment, and higher median family income.
They do though warn against concluding that their results support the use of military spending as an economic stimulus. They claim that the results simply underscore the reality that the United States remains a permanent war economy that requires large amounts of military spending to stave off economic stagnation.

Michael Owyang and Sarah Zubairy (2013) study the impact of shocks to defense and non-defense expenditures on state level personal income and employment. They find that defense spending benefits states with larger manufacturing and retail sectors and states that receive military contracts. Moreover, while non-military shocks also benefit states with the proper industrial mix, they appear to stimulate economic activity in lower-income states.

This paper will contribute to the significant previous study of the relationship between federal defense spending and state level economic health. It will add to the body of literature by following Hooker and Knetter (1997) and Borch and Wallace (2010) and using state-level data, but by studying a period of twenty years that saw unprecedented growth in the defense budget, multiple wars, the terrorist attacks of September 11, 2001, and the greatest economic downturn since the Great Depression. I next turn to my theoretical framework.
III. Theoretical Framework

In order to examine the impact of federal defense expenditures on state level economies, I develop the following theoretical models. These models create a framework that should, using levels of federal defense spending per state and per capita along with other factors, demonstrate the economic impact of defense spending per state in terms of the states unemployment rate and per capita personal income. Furthermore, the last three models should demonstrate the association between federal funding allocations and state population levels. I develop the empirical models in Section V with this framework in mind.

3.1 Unemployment Rate = f (Federal Defense Spending in the state, Per Capita Defense Spending in the State, All Other Federal Spending in the State, All Other Per Capita Spending in the State, State level characteristics, Time constant characteristics, e)

3.2 Per Capita Personal Income = f (Federal Defense Spending in the state, Per Capita Defense Spending in the State, All Other Federal Spending in the State, All Other Per Capita Spending in the State, State level characteristics, Time constant characteristics, e)

3.3 Defense = f (Per Capita Defense Spending in the State, All Other Federal Spending in the State, All Other Per Capita Spending in the State, Per Capita Personal Income, Unemployment Rate, State level characteristics, Time constant characteristics, e)

3.4 Non-Defense = f (Federal Defense Spending in the state, Per Capita Defense Spending in the State, All Other Federal Spending in the State, All Other Per Capita Spending in the State, Per Capita Personal Income, Unemployment Rate, State level characteristics, Time constant characteristics, e)

3.5 Population = f (Federal Defense Spending in the state, Per Capita Defense Spending in the State, All Other Federal Spending in the State, All Other Per Capita Spending in the State, Per Capita Personal Income, Unemployment Rate, State level characteristics, Time constant characteristics, e)
The logic behind model 3.1 and 3.2 is that there are characteristics of a state, most importantly size of the population, that will impact the amount of federal expenditures coming into the state. To account for variations between states, I include population, along with per capita defense and non-defense spending in the state. Further, I include a measure of educational attainment which impacts the ability to obtain a job and often salary level. The model also holds constant national socio-economic shocks that take place during the twenty-year span, including times of war and economic downturns, further narrowing the impact to the state level. These theoretical models suggest that increases in overall defense spending in a state and per capita defense spending will result in lower unemployment rates and higher per capita personal income levels. Model 3.3 and model 3.4 are meant to determine the impact of state population on the amount of defense and non-defense funding received by the state. Model 3.5 is meant to determine if the inverse is also true, whether or not increases in defense and non-defense funding will increase the population of a state. In each case, e represents the random error.

After I obtain my preliminary results, I experiment with three other types of regressions. I perform a fixed effects regression to test for fixed effects present in my data, a seemingly unrelated estimation (SUEST) to simultaneously estimate these two models at once, and compare the impact of my main variables of interest on unemployment rates and per capita personal income levels, and a three-stage least squares regression to deal with endogeneity concerns. The next section details the data I use to estimate these models.
IV. Data

My data consist of a panel dataset covering all fifty states and the District of Columbia for the years of 1990, 1995, 2000, 2005, and 2010. This results in 2,750 observations, with no missing observations.

The data on federal spending come entirely from the U.S. Department of Commerce Census Bureau’s now discontinued Consolidated Federal Funds Report (CFFR). Part of the Census Bureau’s Federal Financial Statistics program, the CFFR was published annually between 1983 and 2010 before the Federal Financial Statistics program was terminated as a result of cost savings in 2010. The archived reports remain available online at the Census Bureau’s website. The reports tracked nearly all federal spending, broken down by agency and program, then further broken down by state, country and Congressional district. The following table gives descriptive statistics for all of my variables. For the purpose of this table, monetary values have not been adjusted for inflation, therefore maximum and minimum can be from different years and therefore have different nominal values.
Table 2: Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defense (millions of dollars)</td>
<td>255</td>
<td>6,094.729</td>
<td>8,713.145</td>
<td>153</td>
<td>58,115</td>
</tr>
<tr>
<td>Non-Defense (millions of dollars)</td>
<td>255</td>
<td>30,663.64</td>
<td>36,365.09</td>
<td>1619</td>
<td>278,059</td>
</tr>
<tr>
<td>Per Capita Defense (dollars)</td>
<td>255</td>
<td>1,264.517</td>
<td>1,444.554</td>
<td>188.78</td>
<td>14,456.62</td>
</tr>
<tr>
<td>Per Capita Non-Defense (dollars)</td>
<td>255</td>
<td>6,483.446</td>
<td>7,212.874</td>
<td>2,395.69</td>
<td>88,447.56</td>
</tr>
<tr>
<td>Population</td>
<td>255</td>
<td>5,501,676</td>
<td>6,145,074</td>
<td>453,690</td>
<td>3.73e+07</td>
</tr>
<tr>
<td>Per Capita Personal Income (dollars)</td>
<td>255</td>
<td>29,203.29</td>
<td>9,151.519</td>
<td>13,288</td>
<td>63,741</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>255</td>
<td>5.656471</td>
<td>2.115826</td>
<td>2.3</td>
<td>13.5</td>
</tr>
<tr>
<td>Recession*</td>
<td>255</td>
<td>51</td>
<td>0.4007866</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>War*</td>
<td>255</td>
<td>153</td>
<td>0.4908614</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Education</td>
<td>255</td>
<td>82.91894</td>
<td>5.917504</td>
<td>64.3</td>
<td>92.7</td>
</tr>
</tbody>
</table>

*Binary variable, where the value of 1 indicates the presence of a condition and 0 indicates its absence. For binary variables, the mean is replaced with the number of observations where the value equals 1.

For the purpose of this study, I focus on the “Federal Government Expenditure for Defense Department and All Other Agencies by State and Outlying Area” section of each report. This table provides federal expenditures for the Defense Department, All Other Agencies (Total known Federal Government Expenditures minus known Defense Department Expenditures), the per capita value for each, as well as the percent distribution for each. Extracting data on overall
spending and per capita spending for the Defense Department and all other agencies from the 1990, 1995, 2000, 2005 and 2010 reports, I create a spreadsheet including data for each state and year.

I should note that the data provided by the Consolidated Federal Funds Report are not complete. The data provided by the CFFR do not include expenditures from the Defense Department and State Department’s Oversees Contingency Operations (OCO) fund. It does not include expenditures for the Central Intelligence Agency (CIA), the Defense Intelligence Agency (DIA), and the National Security Agency (NSA). Also, certain Department of Defense contracts are classified with respect to location of performance, which will limit knowledge of the exact spending to states. Therefore, the levels of expenditures for the Defense Department and all other federal agencies are not exact, but are consistent for the purpose of this study. Furthermore, the data used in this study likely account for a majority of the funding that actually reaches and impacts the state, as opposed to defense funding that ultimately ends up supporting operations and infrastructure overseas.

I obtain data for the average annual unemployment rates by state from the U.S. Department of Labor’s Bureau of Labor Statistics Local Area Unemployment Statistics and Current Population Survey March 2015 Release. The unemployment rate measures the unemployed percentage of the civilian labor force, those who do not have a job, are currently available for work, or have actively looked for work in the previous four weeks.

I obtain data on the per capita personal income per state from the Department of Commerce’s Bureau of Economic Analysis’ Economic Profile of Annual State Personal Income and Employment. The rate is calculated by dividing income by midyear population estimates from the Census Bureau. The Bureau of Economic Analysis is constantly updating historical data. These
Data in this study were most recently updated on September 30, 2015 to include revised estimates for 1976 to 2013.

Data on each states’ population are from the Department of Commerce’s Bureau of Economic Analysis’ Personal Income Summary. The data are derived from the U.S. Census Bureau’s midyear population estimates. These data were last updated on September 30, 2015 and included revised estimates for 1976 to 2014.

Data on educational attainment by state are from various U.S. Census Bureau surveys. Data for 1990 and 2000 are from the U.S. Census Bureau’s Decennial Census. Data for 1995 and 2005 are from the U.S. Census Bureau’s Current Population Survey and data for 2010 are from the 2010 American Community Survey one-year estimate.

In order to account for values not adjusted for inflation, I use the “cpigen” command in Stata. This command generates two variables, CPI and CPI-U which are normalized to 2000 dollars. Therefore, for each state’s data for the year 2000, the variables CPI and CPI-U are equal to 1. CPI has a supported range of 1913 to 2012 and uses the Bureau of Labor Statistics (BLS) research series, a historical series of inflation that is measured consistently over the entire range. This series applies recent improvements to the way the BLS measures CPI to previous performance of the Consumer Price Index in earlier periods. CPI-U has a supported range of 1913 to 2013 and is a seasonally adjusted measure of the goods and services purchased by urban customers. For this study I chose to use CPI as it encompasses all customers, rather than just urban customers. “Cpigen” was created by Austin Nichols of the Urban Institute in Washington, DC. While the level of inflation could vary between states, for the purpose of this study, any variation was considered insignificant. The CPI multiplier generated for each year is as follows:
I next report my methods of estimation and the results from estimating the empirical equations.

<table>
<thead>
<tr>
<th>Year</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>0.7828356</td>
</tr>
<tr>
<td>1995</td>
<td>0.8911734</td>
</tr>
<tr>
<td>2000</td>
<td>1.0</td>
</tr>
<tr>
<td>2005</td>
<td>1.133913</td>
</tr>
<tr>
<td>2010</td>
<td>1.266227</td>
</tr>
</tbody>
</table>
V. Empirical Models

I propose the following six equations:

5.1 $\text{UNEMPLOYMENTRATE}_t = \beta_0 + \beta_1 \text{DEFENSE}_t + \beta_2 \text{NONDEFENSE}_t + \beta_3 \text{PERCAPITADEFENSE}_t + \beta_4 \text{PERCAPITANONDEFENSE}_t + \beta_5 \text{POPULATION}_t + \beta_6 \text{PERCAPITAINCOME}_t + \beta_7 \text{CPI}_t + \beta_8 \text{WAR}_t + \beta_9 \text{RECESSION}_t + \beta_{10} \text{EDUCATION}_t + e$

5.2 $\text{PERCAPITAINCOME}_t = \beta_0 + \beta_1 \text{DEFENSE}_t + \beta_2 \text{NONDEFENSE}_t + \beta_3 \text{PERCAPITADEFENSE}_t + \beta_4 \text{PERCAPITANONDEFENSE}_t + \beta_5 \text{POPULATION}_t + \beta_6 \text{UNEMPLOYMENTRATE}_t + \beta_7 \text{CPI}_t + \beta_8 \text{WAR}_t + \beta_9 \text{RECESSION}_t + \beta_{10} \text{EDUCATION}_t + e$

5.3 $\text{DEFENSE}_t = \beta_0 + \beta_1 \text{NONDEFENSE}_t + \beta_2 \text{PERCAPITADEFENSE}_t + \beta_3 \text{PERCAPITANONDEFENSE}_t + \beta_4 \text{CPI}_t + \beta_5 \text{UNEMPLOYMENTRATE}_t + \beta_6 \text{PERCAPITAINCOME}_t + \beta_7 \text{POPULATION}_t + \beta_8 \text{WAR}_t + \beta_9 \text{RECESSION}_t + \beta_{10} \text{EDUCATION}_t + e$

5.4 $\text{NONDEFENSE}_t = \beta_0 + \beta_1 \text{DEFENSE}_t + \beta_2 \text{PERCAPITADEFENSE}_t + \beta_3 \text{PERCAPITANONDEFENSE}_t + \beta_4 \text{CPI}_t + \beta_5 \text{UNEMPLOYMENTRATE}_t + \beta_6 \text{PERCAPITAINCOME}_t + \beta_7 \text{POPULATION}_t + \beta_8 \text{WAR}_t + \beta_9 \text{RECESSION}_t + \beta_{10} \text{EDUCATION}_t + e$

5.5 $\text{POPULATION}_t = \beta_0 + \beta_1 \text{DEFENSE}_t + \beta_2 \text{NONDEFENSE}_t + \beta_3 \text{PERCAPITADEFENSE}_t + \beta_4 \text{PERCAPITANONDEFENSE}_t + \beta_5 \text{UNEMPLOYMENTRATE}_t + \beta_6 \text{PERCAPITAINCOME}_t + \beta_7 \text{CPI}_t + \beta_8 \text{WAR}_t + \beta_9 \text{RECESSION}_t + \beta_{10} \text{EDUCATION}_t + e$
\[5.6\] \text{UNEMPLOYMENTRATE}_t = \beta_0 + \beta_1 \text{DEFENSE}_t + \beta_2 \text{NONDEFENSE}_t + \\
\beta_3 \text{PERCAPITADEFENSE}_t + \beta_4 \text{PERCAPITANONDEFENSE}_t + \\
\beta_5 \text{POPULATION}_t + \beta_6 \text{CPI}_t + \beta_7 \text{WAR}_t + \\
\beta_8 \text{RECESSION}_t + \beta_9 \text{EDUCATION}_t + e

\[
\text{PERCAPITAINCOME}_t = \beta_0 + \beta_1 \text{DEFENSE}_t + \beta_2 \text{NONDEFENSE}_t + \\
\beta_3 \text{PERCAPITADEFENSE}_t + \beta_4 \text{PERCAPITANONDEFENSE}_t + \\
\beta_5 \text{POPULATION}_t + \beta_6 \text{CPI}_t + \beta_7 \text{WAR}_t + \\
\beta_8 \text{RECESSION}_t + \beta_9 \text{EDUCATION}_t + e
\]

Where:

- \text{UNEMPLOYMENTRATE} is the average annual unemployment rate in the state.
- \text{PERCAPITAINCOME} is the midyear total income in the state divided by the midyear population estimate from the Census Bureau.
- \text{DEFENSE} is the total federal expenditures by the Defense Department in the state measured in millions of dollars.
- \text{NONDEFENSE} is the total federal expenditures not including the Defense Department spending in the state measured in millions of dollars.
- \text{PERCAPITADEFENSE} is the total federal expenditures by the Defense Department in the state divided by the population in the state measured in dollars.
- \text{PERCAPITANONDEFENSE} is the total federal expenditures not including the Defense Department in the state divided by the population in the state measured in dollars.
- \text{POPULATION} is the midyear population estimate by the Census Bureau for the state.
- \text{CPI} is a multiplier to turn nominal dollars into 2000 dollars.
- \text{WAR} is an indicator variable which equals one if the United States was in military conflict any time during the year of analysis, and zero otherwise.
- \text{RECESSION} is an indicator variable which equals one if the United States was officially in a recession anytime during the year of analysis, and zero otherwise.
- \text{EDUCATION} is the percent of the state’s population twenty-five years and over with a high school diploma.
- \text{e} is the random error, and

Expected signs for each model are summarized as follows:

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Unemployment Rate</th>
<th>Per Capita Personal Income</th>
<th>Defense</th>
<th>Non-Defense</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defense</td>
<td>-</td>
<td>+</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Non-Defense</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Per Capita Defense</td>
<td>-</td>
<td>+</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Per Capita Non-Defense</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>CPI</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Population</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Per Capita Personal Income</td>
<td>-</td>
<td>-</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>-</td>
<td>-</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Recession</td>
<td>+</td>
<td>-</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>War</td>
<td>-</td>
<td>+</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Education</td>
<td>-</td>
<td>+</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

UNEMPLOYMENTRATE and PERCAPITAINCOME serve as proxies for the state economy and are the dependent variables in my model. They are limited because the intent of the model is to show the impact on the state economy and they may not completely represent the health of the entire state’s economy.
DEFENSE, NONDEFENSE, PERCAPITADEFENSE and PERCAPITANONDEFENSE are intended to show the total amount of discretionary spending, both defense and non-defense from the federal government in each state and per individual in each state. As previously stated, they are limited in that they do not include mandatory spending, spending on most intelligence agencies, Overseas Contingency Operations (OCO) funding from the Defense Department and State Department and any spending whose location is deemed classified by the Defense Department.

POPULATION is a state level demographic variable meant to account for differences in the size of the state and therefore the potential need for a certain level of federal funding.

CPI is included to adjust for inflation.

WAR is a time level variable meant to account for an increased need for defense funding as a result of being at war. The three years including this variable are 1990 (Gulf War), 2005 (Iraq and Afghanistan) and 2010 (Iraq and Afghanistan). A significant amount of the funding for Operation Enduring Freedom (Afghanistan War) and Operation Iraqi Freedom (Iraq War) was provided through supplemental appropriations, however, later known as the Overseas Contingency Operations (OCO) fund.

RECESSION is intended to account for the state level consequences of the recession that took place between July 1990 and March 1991. While there were also officially recessions between March and November 2001 and December 2007 through June 2009, I chose only to include the RECESSION variable if the recession occurred during the time of analysis.

EDUCATION is intended to account for state level variations in educational attainment. It is a measure of the percent of the state’s total population twenty-five years and over with a high school diploma, and can represent a measure of human capital.
e is error, as earlier indicated.

I next report the results from my estimations.
VI. Results and Analysis

Using the described dataset, I first measure for the impact of defense spending on state level unemployment rates and per capita personal income. Based on the results obtained from these models, I regress to look at the impact of population on total defense and non-defense funding distributed to states. Finally, based on my conclusion that a state’s population matters significantly when looking at the impact of federal funding, I test to see if increased federal defense funding and non-defense funding sent to a state also leads to increases in population. All models I test are highly significant at a 99 percent confidence level and given the complexity of estimating the impact of a specific funding stream, all models yield reasonably high R²s, which I believe is a result of including both defense and non-defense funding in each regression. Since the discretionary budget is a set value, by default if one of those funding categories decreases or increases, the other will do the inverse.

To start, I employ two different proxies to represent the state economy. Each proxy, unemployment rate and per capita personal income, is represented by a separate regression, though with the same independent variables. The results from these two regressions are summarized by the following statistics:

| Table 5: Model Summary – Unemployment Rate and Per Capita Personal Income |
|---------------------------------|-----------------|-----------------|-----------------|
| **Dependent Variable**       | **R-Squared**   | **Standard Error of Regression** | **F-Statistic** |
| Unemployment Rate             | 0.4886          | 1.5437          | 23.71***        |
| Per Capita Personal Income    | 0.8520          | 3592.1          | 148.45***       |

***indicates 99 percent confidence that the regression is statistically significant
While the $R^2$ for model 5.1, estimating the impact of federal defense spending on the state level unemployment rate, is the lowest of any model I estimated at 0.4886, the F-Statistic is statistically significant at the 99 percent confidence level. On the other hand, the $R^2$ for model 5.2, estimating the impact of federal defense spending on state level per capita personal income, is a much greater at 0.8520 and the F-Statistic indicates the regression is also statistically significant at the 99 percent confidence level. The coefficients for the main variables of interest in these models, defense spending, non-defense spending, per capita defense spending and per capita non-defense spending are as follows:

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Variables of Interest: Spending Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Defense</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>-0.0000465* (0.000245)</td>
</tr>
<tr>
<td>Per Capita Personal Income</td>
<td>-0.1327388*** (0.0446732)</td>
</tr>
</tbody>
</table>

Estimates listed with robust standard errors in parentheses. *indicates 90 percent confidence, **indicates 95 percent confidence, ***indicates 99 percent confidence

The findings in table six demonstrate both expected and unexpected effects, and importantly, likely point to the fact that overall defense spending is the wrong variable to focus on for the purpose of this study. First, as I hypothesized, additional federal defense spending is associated with a reduction in the unemployment rate, though, is only statistically significant at a 90 percent confidence level. Second, contrary to my hypothesis, the negative coefficient on DEFENSE shows that additional federal defense dollars spent in a state is associated with lower per capita income. This result is statistically significant at a 99 percent confidence level. All other
federal spending produces a strong, positive and highly significant coefficient on unemployment, and a positive, highly significant, though smaller coefficient on per capita personal income.

Unlike overall defense spending, per capita defense spending is associated with a positive and significant impact on the unemployment rate. Therefore, per capita defense spending is actually associated with increases in unemployment, and it does so at a much greater magnitude than defense spending reduces unemployment. While per capita non-defense spending is also associated with increases in unemployment, it does so at a much lesser rate, and though, unlike all other variables of interest, it is insignificant.

At the same time, per capita defense funding and per capita non-defense funding are associated with increases in per capita personal income. While both are significant, per capita defense spending is associated with increases in per capita personal income at a much higher magnitude. These results seem to corroborate the conclusions of many of the previous studies referenced in Section II. On a per capita basis, federal defense dollars appear to create fewer jobs than do federal non-defense dollars, since the coefficient for the impact of defense dollars on the unemployment rate (0.0003505) is larger than the coefficient for the impact of non-defense dollars on unemployment rate (0.0000207), though this result is insignificant at any conventional level. However, the jobs created from defense dollars actually appear to pay more compared to jobs created from non-defense dollars, since the coefficient for the impact of per capita defense dollars on per capita personal income (1.5100326) is much larger than the coefficient for the impact of per capita non-defense dollars on per capita personal income (0.1588365).

To compare the impact of my main variables of interests on state unemployment rates versus state per capita income levels, I perform a seemingly unrelated estimation (SUEST) to
simultaneously estimate these two models at once. The results from this regression are summarized by the following table:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi$^2$-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defense</td>
<td>9.19***</td>
</tr>
<tr>
<td>Non-Defense</td>
<td>13.16***</td>
</tr>
<tr>
<td>Per Capita Defense</td>
<td>20.77***</td>
</tr>
<tr>
<td>Per Capita Non-Defense</td>
<td>5.31</td>
</tr>
</tbody>
</table>

***Indicates 99% confidence that the regression is statistically significant

My results demonstrate a statistically significant difference between the impact of defense spending on unemployment rates and defense spending on per capita personal income levels. I find similarly statistically significant differences for the impact of per capita defense spending on each state level proxy, and non-defense funding overall on each state level proxy. However, the difference is not statistically significant for per capita non-defense funding.

Based on these results, I believe it is likely that the varying distribution of defense and non-defense federal spending results in the impact of that spending being disproportionally meaningful between states. Further, I assume that this variance is correlated with the needs of each state, which is likely related to the population of the state, at least as a proxy. Therefore, based on the varying results obtained from these regressions, I use the same dataset to examine the impact of state population on total defense and non-defense funding distributed to the state. The results from these two regressions are summarized by the following statistics.
Consistent with my first two models, both the model for the impact on defense spending and non-defense spending produce F-Statistics that are statistically significant at a 99 percent confidence level and both models produce very good $R^2$s. In these models, the coefficient for the main variable of interest, population, is as follows:

These results demonstrate that population has a positive and highly significant impact on the distribution of defense and non-defense funding, and further that the impact of the population is higher on non-defense, by an order of magnitude. A one million person increase in the population of a state is associated with an increase in federal defense dollars sent to the state of $448.8$ million and $3,945.9$ million in non-defense dollars sent to a state. Therefore, it is likely that larger states receive higher amounts of federal defense and non-defense dollars. Unsurprisingly, larger states need more resources to provide for the people of their state and considering that non-defense dollars’ account for a larger portion of federal dollars sent to a state and cover a wider range of
resources, non-defense dollars’ increase at a faster rate than defense dollars as the population increases. These results indicate that the impact of per capita defense and per capita non-defense dollars on the unemployment rate and per capita personal income are better measures than the impact of total defense and non-defense spending.

Since I conclude from these models that the amount of federal dollars received and the significance of the impact on the state likely depends on the population of the state, I regress to see if the inverse is also true, that is will increased federal defense funding and non-defense funding sent to a state also lead to increases in the population? The results from this regression are summarized by the following statistics:

<table>
<thead>
<tr>
<th>Table 10: Model Summary – Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
</tr>
<tr>
<td>Population</td>
</tr>
</tbody>
</table>

***indicates 99 percent confidence that the regression is statistically significant

Similar to my first four regressions, this model produces another highly significant F-Statistic and $R^2$. In this model, the coefficient for the main variables of interest, were as follows:

<table>
<thead>
<tr>
<th>Table 11: Model Coefficient - Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Population</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Estimates listed with robust standard errors in parenthesis. *indicates 90 percent confidence, **indicates 95 percent confidence, ***indicates 99 percent confidence

As I expected, an increase in defense funding and non-defense funding sent to a state is associated with increases in the population of the state. While the magnitude of the impact for both
defense and non-defense funding is positive and about the same value, only non-defense funding is statistically significant at the 99 percent confidence level, whereas the coefficient on defense funding is not statistically significant at any reasonable confidence level. I believe it is likely that the insignificance of the coefficient on defense funding is as result of defense funding impacting significantly fewer people than non-defense funding. These results further substantiate my conclusion that while defense spending may be associated with a minor, though positive impact on the state economy, it is likely that the real economic impact is a result of population movement associated with the distribution of both federal defense and non-defense funding. While the population results point to clear endogeneity, I am not concerned because these results lead me to conclude that the per capita approach is likely a better measure of the association between federal spending and state unemployment rates and per capita personal income.

To determine if fixed effects are important for my data, I repeat the regressions in models 5.1 and 5.2 using a fixed effects command. The results from this regression are summarized by the following table:
Both my regressions for the impact of federal spending on state level unemployment rates and per capita personal income were statistically significant at the 99 percent confidence level. In each equation, the variable accounting for inflation (CPI), and my binary variables accounting for being in military conflict (WAR) and for being in a recession (RECESSION) are omitted because of collinearity. Importantly, the direction of the coefficient for each of my main variables of interest, defense spending, non-defense spending, per capita defense spending and per capita non-defense spending, is the same as my previous results.

The following paragraphs will discuss the results obtained from my models for variables not discussed above.

**Spending Variables:** Unsurprisingly, increases in non-defense funding are associated with increases in defense funding, and vice versa. Increases in defense funding are associated with
larger increases in non-defense funding, whereas increases in non-defense funding produce smaller increases in defense funding. The raw data from the Consolidated Federal Funds Reports used for this study corroborate this claim. Both of these coefficients were highly significant at a 99 percent confidence level.

**Per Capita Spending Variables:** I included per capita measures of defense and non-defense funding per state to control for variations in the population. As expected, increases in per capita defense funding are associated with increases in defense funding, and decreases in per capita non-defense funding. Increases in per capita non-defense funding are associated with increases in non-defense funding, and decreases in per capita defense funding. All of these coefficients were highly significant at a 99 percent confidence level. Furthermore, since any per capita measure has population in the denominator, increases in the per capita defense funding and per capita non-defense funding received by a state is associated with a decrease in the population, though these coefficients were not significant at any reasonable confidence level.

**CPI:** In order to account for values not adjusted for inflation, I include a control variable for the consumer price index. It is positive and significant at a 99 percent confidence level when I regress for the impact on unemployment rate and per capita personal income, but negative and significant at a 99 percent confidence level when I regress for the impact on population. In my models regressing for the impact of population on defense and non-defense funding, the coefficients are again positive, though less significant.

**Population:** Included simply as a control variable, the coefficient on POPULATION in model 5.1 and model 5.2 are both insignificant. Though as noted, POPULATION becomes more important and highly significant in model 5.3 and model 5.4.
**Per Capita Personal Income:** In model 5.1, I find that an increase in per capita personal income is associated with a reduction in the unemployment rate since an increase in per capita personal income will likely occur if the population is reduced, and a reduction in the population will decrease the unemployment rate. This result is highly significant at a 99 percent confidence level. Also unsurprising based on the coefficients on DEFENSE and NON-DEFENSE in my model regressing for the impact on per capita personal income, increases in per capita personal income are associated with decreased federal defense spending in a state and increased non-defense spending in a state. Both of these coefficients are significant at a 95 percent confidence level. And lastly, again, as a result of population levels being a significant component to measuring per capita levels of anything in a state, population and per capita income have a positive association, though the coefficient is not significant at a reasonable level.

**Unemployment Rate:** I find that increases in the unemployment rate are associated with a reduction in per capita income levels in a state and this result is highly significant at a 99 percent confidence level. This result is unexpected, since increases in the unemployment rate likely occur during times of economic downturn when income levels would also decrease. Or, as has been previously discussed, both of these variables are related to the population. An increase in the unemployment rate could be the result of an increase in the population, which would reduce any per capita measurement. Further, in model 5.5 an increase in the unemployment rate is associated with a decrease in the population, though the result is insignificant at any reasonable level. This is likely due to an increase in the unemployment rate forcing people to move elsewhere in search of employment. Lastly, an increase in the unemployment rate is associated with a decrease in defense funding sent to a state and an increase in federal funding sent to a state. Both of these results are significant at a 99 percent confidence level. Neither of these results is surprising since an increase
in the unemployment rate likely means there is a need for increased resources for the newly
unemployed and existing social welfare programs, which are in fact, likely automatic. And since
non-defense funding has increased, defense funding has likely decreased.

**Recession:** As expected, a recession is associated with increases in the unemployment rate
by over three percentage points. Furthermore, a recession is associated with an increase in per
capita income, which is likely the result of people leaving the workforce, therefore reducing the
pool from which the per capita income is measured. Unsurprisingly, recessions hit the poorest
populations the hardest. Both of these results are significant at a 99 percent confidence level. The
coefficients for the impact of a recession on defense and non-defense funding are both highly
insignificant at a reasonable confidence level. While the results are unexpected, since a recession
is associated with an increase in defense funding and a decrease in non-defense funding, I believe
this is a result of the only year including a recession in this study being 1990, a year that also
included a war. Also insignificant, a recession is associated with a decrease in the population of a
state.

**War:** I include a dummy variable for being at war during a given year to control for the
need for increase defense funding. Though as previously discussed, most of the funding for a war
is likely not included in the Consolidated Federal Funds Reports used to measure funding levels
for this study. These reports do not include funding for intelligence agencies, Overseas
Contingency Operations (OCO) funding from the Defense Department and State Department and
any spending deemed classified by the Defense Department. Only one of the coefficients on WAR
is significant, which finds being at war is associated with a decrease in per capita personal income
at a 95 percent confidence level.
Education: The impact of a state’s level of educational attainment produces mixed results, which is unsurprising considering the data is gathered from various U.S. Census Bureau surveys. A higher percentage of the state’s population twenty-five years and over with a high school diploma is associated with a decrease in the unemployment rate, an increase in per capita income, a decrease in defense funding, an increase in non-defense funding and a decrease in the population. While the coefficient for the impact on the unemployment rate is insignificant, the other coefficients are significant at various confidence levels. Better data from a single source will likely produce a better result for the impact of education levels in a state.

There are some potential limitations in utilizing this data to come to a meaningful conclusion. I assume endogeneity is likely an issue in this study considering the impact that population levels likely have on many of the independent and dependent variables. As I have previously discussed, total population and changes in population contribute significantly to any per capita measure, but are also probably linked to the unemployment rate, and likely change during a recession and during a time of war. At the same time, I believe it is clear that population levels are highly associated with both the total amount of defense and non-defense funding received by a state and with the impact that funding can have on a state’s economy. To check for the impact of endogeneity, I performed a three-stage least squares (3SLS) regression using model 5.1 and model 5.2. The coefficients for the main variables of interest in these models, defense spending, non-defense spending, per capita defense spending and per capita non-defense spending are as follows:
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Variables of Interest: Spending Variables</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Defense</td>
<td>Non-Defense</td>
<td>Per Capita Defense</td>
<td>Per Capita Non-Defense</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>-0.0000313 (0.0000266)</td>
<td>0.0000311*** (8.87e-06)</td>
<td>0.0001562 (0.0001504)</td>
<td>-1.61e-06 (0.0000267)</td>
</tr>
<tr>
<td>Per Capita Personal Income</td>
<td>-0.1090897* (0.0618618)</td>
<td>0.0362317* (0.0206283)</td>
<td>1.392296*** (0.3500441)</td>
<td>0.1600547** (0.0620786)</td>
</tr>
</tbody>
</table>

Estimates listed with robust standard errors in parentheses. *indicates 90 percent confidence, **indicates 95 percent confidence, ***indicates 99 percent confidence

Similar to my original model, both models are highly significant at a 99 percent confidence level and include relatively the same $R^2$. The sign of all coefficients is the same as in my original regressions, except for the association between per capita non-defense funding and unemployment rate, though this result is highly insignificant. Furthermore, while the sign of the coefficients may be the same, most results are no longer significant at conventional levels. This leads me to conclude that while endogeneity exists in my model, it does not have a significant impact on my results.

There is also the potential for omitted variable bias given the limitations of the Consolidated Federal Funds Reports and the omission of funding for intelligence agencies and classified programs, both of which likely reduce the impact I am able to account for in certain states that contain offices for intelligence agencies or large classified programs. Multicollinearity is also an issue with this dataset since I include both measures of total defense and non-defense funding and the per capita levels for each source of funding. Though, based on my results I conclude that the per capita measures for defense and non-defense funding are likely better
measures for the impact of federal funding on state level unemployment rates and levels of per capita personal income.

In the next section I conclude and discuss the policy implications of my findings.
### Table 14: Model Coefficients

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Unemployment Rate (Model 5.1)</th>
<th>Per Capita Personal Income (Model 5.2)</th>
<th>Defense (Model 5.3)</th>
<th>Non-Defense (Model 5.4)</th>
<th>Population (Model 5.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-4.379466 (2.868374)</td>
<td>-45297.99*** (5392.061)</td>
<td>-309.3933 (6297.435)</td>
<td>-40451.1** (18800.48)</td>
<td>1.62e+07*** (3128559)</td>
</tr>
<tr>
<td>Defense</td>
<td>-0.0000465* (0.000245)</td>
<td>-0.1327388*** (0.0446732)</td>
<td></td>
<td>1.026268*** (0.2320411)</td>
<td>135.3085 (85.60364)</td>
</tr>
<tr>
<td>Non-Defense</td>
<td>0.0000362*** (9.05e-06)</td>
<td>0.0597365*** (0.0167891)</td>
<td>0.1207243*** (0.0413991)</td>
<td></td>
<td>139.9562*** (17.07728)</td>
</tr>
<tr>
<td>Per Capita Defense</td>
<td>0.0003505** (0.0001456)</td>
<td>1.510326*** (0.3381006)</td>
<td>4.155011*** (0.894325)</td>
<td>-5.117013*** (1.065879)</td>
<td>-503.8582 (348.3658)</td>
</tr>
<tr>
<td>Per Capita Non-Defense</td>
<td>0.0000207 (0.0000279)</td>
<td>.1588365** (0.0703604)</td>
<td>-0.529318*** (0.14023008)</td>
<td>0.9307933*** (0.159454)</td>
<td>-40.95832 (55.01338)</td>
</tr>
<tr>
<td>CPI</td>
<td>14.97867*** (2.341463)</td>
<td>45308.21*** (4456.774)</td>
<td>10979.67* (5990.725)</td>
<td>14807.8 (12178.59)</td>
<td>-1.08e+07*** (2756450)</td>
</tr>
<tr>
<td>Population</td>
<td>-6.25e-08 (4.73e-08)</td>
<td>0.0001171 (0.0000821)</td>
<td>0.0004488** (0.0002077)</td>
<td>0.0039459*** (0.0003419)</td>
<td></td>
</tr>
<tr>
<td>Per Capita Personal Income</td>
<td>-0.0001396*** (0.0000287)</td>
<td>-0.148271** (0.0619957)</td>
<td>0.5672358** (0.2267441)</td>
<td>39.42631 (29.47456)</td>
<td></td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td></td>
<td>-755.8442 (151.368)**</td>
<td>-281.3274** (169.6771)</td>
<td>1858.803*** (520.7188)</td>
<td>-113909.8 (81146.36)</td>
</tr>
<tr>
<td>Recession</td>
<td>3.142586*** (0.8162471)</td>
<td>6299.066*** (1922.044)</td>
<td>599.4409 (1975.974)</td>
<td>-625.8561 (5405.882)</td>
<td>-1382635 (1029830)</td>
</tr>
<tr>
<td>War</td>
<td>-0.7064724 (0.4853017)</td>
<td>-2659.636** (1258.187)</td>
<td>41.58032 (1251.319)</td>
<td>7.233654 (2738.553)</td>
<td>491918.7 (519064.3)</td>
</tr>
<tr>
<td>Education</td>
<td>-0.0283621 (0.025556)</td>
<td>344.0245*** (42.04646)</td>
<td>-83.87613** (39.77757)</td>
<td>19.30646** (18800.48)</td>
<td>-54065.38* (27575.13)</td>
</tr>
</tbody>
</table>

Estimates listed with robust standard errors in parenthesis. *indicates 90 percent confidence, **indicates 95 percent confidence, ***indicates 99 percent confidence.
VII. Conclusion and Policy Recommendations

The purpose of this study is to examine the impact of federal defense funding on key state-level economic indicators. Specifically, I investigate the impact of annual federal defense spending on unemployment rates and the per capital personal income between 1990 and 2010 at the state level. While previous studies have focused on the national level impact of defense funding or the state level impact during a different period of time, I chose to study a twenty-year span that includes years of relative peace, time at war, and times of both a flourishing economy and an economy before and during the worst economic collapse since the Great Depression.

I hypothesize that states receiving a larger share of federal defense expenditures will on average have lower unemployment rates and higher per capita personal income. I base this hypothesis on the fact that despite significant budget constraints facing the country, many politicians, analysts and commentators argue the increased defense funding is a worthy expense since defense funding can act as a stimulus for the economy. While I originally intended to run only two regressions, using data from the U.S. Census Bureau’s Consolidated Federal Funds Report and time and state control variables to regress for the impact of defense funding on unemployment rate and per capita income, the results of those models led me to further study the impact of population on the magnitude and impact of defense funding.

While my hypothesis is partially supported, since increases in defense funding are associated with a reduction in the unemployment rate, I also find that increases in defense funding are associated with decreased per capita income. At the same time, the coefficients on the impact of per capita defense spending and per capita non-defense spending on state level unemployment rates and levels of per capita personal income corroborate the conclusions of many previous studies. On a per capita basis, federal defense dollars create fewer jobs than do federal non-defense
dollars, but the jobs created from defense dollars actually pay more compared to jobs created from non-defense dollars.

As a result of the findings from my original models, I run three more regressions to further investigate the association between population and the distribution of federal funding. Unsurprisingly, I find that the larger states are, the more likely they are to receive higher amounts of federal defense and non-defense dollars and that increases in funding sent to a state leads to increases in the population. These results likely point to the impact of per capita defense and per capita non-defense dollars on unemployment rate and per capita personal income being a better measure than the impact of overall defense and non-defense spending. So while defense spending may have a minor, though positive impact on the state economy, it is likely that the real economic impact varies by state and is largely based on population.

These unexpected results lead to three significant policy implications and many recommendations for future studies of this issue. First, as many of the previous studies I reference in Section II warn against, federal defense spending should not be used as a mechanism to stimulate the economy. While defense spending may have a positive, though minor, impact on the state economy, as I find that defense dollars reduce unemployment, I also find that defense spending is associated with lower per capita income. Since I also find that increases in the population are associated with increased defense dollars sent to a state, and also that increases in defense dollars lead to increases in population, federal defense dollars are likely only to have a positive impact in certain areas across the country. Furthermore, it is likely these areas are already in better economic condition than others and it is unlikely areas that do not receive significant defense funding will be able to attract more. In the future, policymakers should be wary of recommending defense funding as a stimulus. Considering the serious budgetary situation faced by the federal government
since 2011, and the severe consequences of sequestration and its potential return, policymakers must remember that most importantly, defense spending should reflect national security priorities.

Second, non-defense funding may be a significant tool for mitigating increased income inequality in the United States. Despite the fact that I find non-defense funding is associated with increased unemployment, I also find that it is associated with increases in per capita income levels. This corroborates the mixed findings of Pollin and Garrett-Peltier (2007) who find that compared to spending on defense, spending on personal consumption produces generally poorly-paid jobs, spending on education creates a higher number of jobs and a higher average pay than spending on defense. Further, they find that spending on health care, infrastructure, and mass transit creates more jobs than with military spending, but that the average pay will be lower. The mixed results lead me to believe that in order to find the true impact of defense spending on the state economy, future studies should break down non-defense funding into more categories. And while conventional budgetary practices split discretionary spending into defense and non-defense, policymakers should be more mindful of the specific impact of certain sectors and government programs. The fact that non-defense funding is associated with increased per capita income levels and defense funding is associated with reduced per capita income levels, non-defense funding may be a potential resource for resolving the income inequality that plagues the United States.

Third, based on the results of my regressions, specifically the models that find that defense and non-defense funding is generally distributed based on population levels, if policymakers truly want federal funding to act as an economic instrument, they should be more aware of distributing funding for programs that improve the economy to areas that really need it. By allowing valuable defense and non-defense federal funding to be largely distributed based on population, policymakers ignore the needs of economically distressed areas. The current process does not
target these areas in an effort to improve their economic condition and instead continuously sends federal funding to the same places year-after-year.

Importantly, the inconsistent conclusions from this and other studies demonstrate that Congress, which decides funding levels for specific programs, and agencies in the executive branch, that distribute federal funding through grant programs and decide the formulas that determine funding to states, should remember that the distribution of federal funding should first and foremost reflect the domestic and national security priorities of the country.

Lastly, there are multiple ways in which future studies on the impact of federal funding, both defense and non-defense, on state level economies could build on and improve the data I use in this study. As has been discussed, the Consolidated Federal Funds Reports do not account for funding for intelligence agencies and other classified programs. If at all possible, future studies should attempt to include more federal funding data than are included in the CFFR. Future studies should also examine the impact of specific non-defense programs and should find a better way to account for economic downturns. While using times of recession is a simple mechanism, in my data this means that only 1990 was marked as having a recession, despite the years between 2005 and 2010 being marked by the greatest economic crisis since the Great Depression. I believe that future studies should include a dummy variable attempting to measure military installations in each state, since this means the state by default requires more defense funding. They should also include a dummy variable for states that have influential Members of Congress, specifically appropriators. Despite congressional rule changes to eliminate the use of earmarks, appropriators and influential members of congress are generally still able to obtain important federal funding for their congressional districts and states, regardless of need. These policy implications, coupled with concerns over the inability to obtain complete data on federal defense spending and the movement
away from a regular appropriations process present significant challenges for this and other future studies to examine the impact of federal defense spending on state economies.
Endnotes

2 Formerly and commonly referred to as the “Food Stamp Program” or “Food Stamps”
3 Ibid.
7 Ibid., 17.
12 Consolidated Federal Funds Report, U.S. Census Bureau.
References


