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**THESIS**

**FRANCE, GERMANY, GREECE AND THE UNITED  
KINGDOM: AN ANALYSIS AND COMPARISON  
OF BUDGET DEFICITS AND DEFENSE SPENDING**

by

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September 2011

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**FRANCE, GERMANY, GREECE AND THE UNITED KINGDOM:  
AN ANALYSIS AND COMPARISON OF BUDGET DEFICITS AND DEFENSE  
SPENDING**

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Submitted in partial fulfillment of the  
requirements for the degree of

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## **ABSTRACT**

This thesis documents findings on the relationship of government budget deficits and defense spending for France, Germany Greece, and the United Kingdom in detail and for NATO and OECD country collectives. The thesis topic is relevant, as many European countries are justifying their recent cuts in defense spending with high government budget deficits. The author looked at different data sources and metrics to graphically analyze the developments in government budget deficits and defense expenditures for the selected countries over a fifteen-year period and statistically analyze possible interactions between lagged budget deficits and defense expenditures for NATO and OECD country collectives. Six regression models were developed and applied to the country collectives with different time periods, from 1975 to 2009. A fixed effects regression analysis was used to determine the significance levels and the standard errors of the independent variables. The research method consisted of four activities: review of related research, analysis of government budget spending levels, analysis of defense spending levels, and graphical and statistical analysis of government budget deficit and defense spending relationship. The literature survey focused on data research, theories on government budget deficits and defense spending and the European Union's Stability and Growth Pact.

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## **EXECUTIVE SUMMARY**

This thesis documents findings on the relationship of government budget deficits and defense spending for France, Germany, Greece and the United Kingdom in detail and for North Atlantic Treaty Organization (NATO) and Organisation for Economic Co-operation and Development (OECD) country collectives. The thesis topic is relevant, as many European countries are justifying their recent cuts in defense spending with high government budget deficits. The author looked at different data sources and metrics to graphically analyze the developments in government budget deficits and defense expenditures for the selected countries over a fifteen-year period and statistically analyze possible interactions between lagged budget deficits and defense expenditures for NATO and OECD country collectives. Six regression models were developed and applied to the country collectives with different time periods, from 1975 up to 2009. A fixed effects regression analysis was used to determine the significance levels and the standard errors of the independent variables. The research method consisted of four activities: review of related research, analysis of government budget spending levels, analysis of defense spending levels and graphical and statistical analysis of government budget deficit and defense spending relationship. The literature survey focused on data research, theories on government budget deficits and defense spending and the European Union's Stability and Growth Pact (SGP).

The literature survey highlighted difficulties in collecting data on defense expenditures and points out that classical economic theories are still being reflected by politicians and researchers today with respect to balanced budgets and deficit spending. Most research on defense economics has been done during or right after the Cold War, so that changes in political priorities might have an influence on today's government budget deficit and military spending relationship. The SGP explains the current political decisions in Europe and their influence on the current European defense budget trends.

By looking at the economic data for the four selected countries, France and Germany had almost constant increases in public expenditures over the last fifteen years and the two financial crises, in 2001 and 2008, had significant negative impacts on the

revenue side for all four selected countries. The government budget deficits for the four countries over the last fifteen years are similar in their overall trends, but with different magnitudes. The recent financial crisis in 2008, almost tripled the level of government budget deficits compared to the financial crisis in 2001, pushing all four countries well above the European Union's deficit limit of three percent of gross domestic product (GDP). The trends in the countries' budget spending functions, except for the United Kingdom, indicate positive growth rates in the mandatory spending categories. The defense expenditures as a percentage of the total expenditures are the only spending category for all four countries that decreased at a constant rate over the last fifteen years.

The evaluation of the four countries' military expenditures indicate that France, Germany and the United Kingdom seemed to contribute an almost stable percentage of GDP for military spending at a small and constantly decreasing rate up to 2003–2004. Among the four countries, Greece has the lowest GDP per capita, but the highest military expenditures in percentage of GDP. Similar military spending levels for the United Kingdom and Greece as well as Germany and France can be found in real terms per capita per soldier. The United Kingdom has the highest military expenditures and Germany spends the lowest amount of money on military expenditures. Greece generates high costs on personnel, but the United Kingdom shows the highest costs in supporting military activities for deployed forces. France and Germany show similar trends in all four NATO military spending categories.

As all of the four selected countries are, as of recently, undergoing significant budget cuts but still have to fulfill their military obligations, the focus of all four countries is to achieve significant amounts of savings. France and Germany are planning to reduce costs for personnel. Greece is required to reduce its military procurement and the United Kingdom is trying to achieve savings by early decommissioning of aged weapon systems and equipment, delaying or canceling procurements, withdrawing troops and fostering defense cooperations.

Four conclusions can be drawn from the graphical analysis of the budget deficit/military expenditure relationship. First, balanced budgets did not have any significant relationship with military expenditures. Second, except for Greece and the

United Kingdom from 2005 on, the military expenditures decreased on average when expressed in percentage of GDP, but increased on average in real terms. Third, the financial crises in 2001 and 2008 seemed not to have any immediate impact on the military expenditures. Fourth, the United Kingdom and France show more significant decreases and increases in their military expenditures over the given time period than the other two countries. In contrast, it can be concluded that Germany seems to be quite resistant to economic or national security concerns, as Germany shows constant and almost linear growth rates.

The two regression analyses delivered evidence for government budget deficit and military expenditure interaction, but with different statistical significance levels. Both analyses might indicate that military expenditures were still increasing after having a government budget deficit in the previous year as well as an increasing rate in the military expenditures was still present after having an increasing deficit growth rate in the previous year. A government budget deficit two or even three years prior to the current military expenditures might be associated with lower military spending levels. For the four countries, indications can be found that deficits had a stronger negative relationship with military budgets during the Peace-Dividend era than for the Post-9/11 era.

Interactions between government budget deficits and military expenditures are not obvious at first. A graphical analysis can give an overview and might highlight trends, but seems insufficient to catch even small influences, disregarding purely politically influenced decisions that are not related to economic or national security concerns. A fixed effects regression analysis can only detect average trends and is constrained by its sample size. However, the regression analysis delivered interpretable results, but it might need more detailed models to catch effects that might have been disregarded in the presented approach, e.g., military procurement contracts. Some of those effects might not even be quantifiable, like the influence of elections on budget decisions.

# **I. INTRODUCTION**

## **A. THESIS BACKGROUND**

The world financial crises that started in 2008 due to an overspeculated U.S. housing market caused the highest economic downturn in the post–World War II era, with momentous impacts on government budget deficits. The real gross domestic product (GDP) for the Euro area decreased by 4.1 percent in 2009 compared to the previous year (Organisation for Economic Co-Operation and Development, 2010). The budget deficit for the Euro area increased from € 181 B in 2008 to € 565 B in 2009, with Greece showing one of the largest budget deficits with -13.6 percent of GDP (European Commission, 2010, April 22).

As the European Union’s Excessive Deficit Procedure (EDP) has a threshold of not exceeding three percent of GDP in government deficits, European countries were forced to reduce their budget deficits significantly by introducing budget cuts and redistribution of funds to ensure the long-term sustainability of the European Union’s public finances (European Commission, 2011b). These cuts caused discussions about the right level of public expenditures, including defense spending. The German minister of defense explained in May 2010, “‘if one looks at the current numbers by the Finance Ministry there is a need for a paradigm shift’ when it comes to defense spending” (United Press International, 2010).

## **B. THESIS OBJECTIVE**

The objective of this thesis is to examine government deficits and defense expenditures for four selected European countries: France, Germany, Greece, and the United Kingdom, over a timeline of 15 years, using descriptive graphical methods and for North Atlantic Treaty Organization (NATO) and Organisation of Economic Co-operation and Development (OECD) countries, with a timeline up to 35 years using fixed effects regression models. The main focus of the analytical part of this thesis is to identify recent common trends, if any, between budget deficits and defense spending for the selected countries and historical trends for NATO and OECD countries.

### **C. RESEARCH QUESTION**

As economic threats seem to overwhelm current and future military threats, even with still ongoing European military engagements in Afghanistan and Iraq, this thesis will address questions about the economic background for the four selected countries, EU-specific economic requirements and country-specific characteristics of the individual defense expenditures. This will answer the question why Europe decided to decrease defense expenditures significantly within the recent and upcoming years. A closer look at the four countries' budget deficits and defense expenditures over the last fifteen years and a fixed effects regression analysis with a wider range of countries and time periods will address the question of whether any common trends between government budget deficits and defense expenditures can be found.

### **D. SCOPE**

The scope of this thesis is limited to four European countries: France, Germany, Greece, and the United Kingdom. Europe was chosen because most of its countries are facing drastic defense budget cuts over the next years. France, Germany and the United Kingdom were chosen because of their economic role in the European Union. Greece was chosen in contrast, as it has one of the highest military expenditures as percentage of GDP in Europe and has the second highest budget deficit in the European Union.

Chapter II provides a literature review, focusing on data research, existing theories on budget deficits and defense spending, and background information on the European Union's Stability and Growth and the EDP.

For Chapter III and Chapter IV, a timeline starting in 1995 was selected to give a large enough time horizon to capture long-term funding of major weapon systems on one hand, but on the other hand to gain enough reliable data to show the recent financial trends without Cold War influences. The economic and defense data in Chapter III and Chapter IV will be presented in real terms and percentage of GDP.

In the first part of Chapter V, the detailed analysis of the economic data and the defense spending levels is limited to the four selected countries. In the second part of

Chapter V, the timeline for the fixed regression analysis was extended and the number of countries has been increased to give sufficient data for running the fixed effects regression. NATO countries were chosen, as those countries show similar political and economical characteristics with defense expenditures that are tied to common contractual agreements. The OECD countries include all NATO countries, but include as well countries without contractual defense obligations. Due to two different sources of available data on defense expenditures, two regressions were run; first for all NATO countries of 1975 and second for all OECD countries of 1988. Both data sets do not include Turkey due to lack of publicly available economic data.

Chapter VI concludes this thesis and gives an outlook for further research.

## **E. METHODOLOGY**

This thesis is based on a literature review focusing on the characteristics of defense-related data, economic theories and current publications on defense budget trends in Europe. The data research has been conducted depending on certain criteria, and data has been visualized to show trends. Further theories have been examined to document the past and current level of topic-related research. Fixed effects regression analysis has been chosen to eliminate the effect of interactions between the individual countries. The regression models were set up to investigate the relationship of previous years' budget deficits (independent variables) on actual military expenditures (dependent variable).

## **F. STRUCTURE OF THE THESIS**

This thesis starts in Chapter II with a literature review on data research, defense economic theories and their limitations as well as on recent financial publications to give sufficient background information, and to explain the relevance of this thesis.

The descriptive Chapter III concentrates on the four selected countries' government finances, including total government expenditures and revenues, government deficits and net debts as well as public expenditures by function. The goal is to provide a closer look and background on the development of the financial situations of the selected countries.

Chapter IV shows developments in military expenditures, GDP and government deficits for the four selected countries. The military expenditures are presented as share of GDP to show the willingness of each country towards military spending. The structure of military expenditures is explained by looking at the military spending categories as a share of total military expenditures.

Chapter V combines the findings of the two previous chapters, by comparing government deficits and military expenditures over different time periods. Two approaches are used. First, a graphical analysis indicates trends and interactions over the last fifteen years for the four selected countries. Second, the fixed effects regression focuses on identifying statistical evidence for possible interactions between government budget deficits and military expenditures. Compared to the graphical analysis, the regression analysis allows for a larger range of economically and politically similar countries and up to four different time periods.

This thesis concludes by giving conclusions and recommendations for future financial policies as well as for further action and research in Chapter VI.

## **II. LITERATURE REVIEW**

The focus of this chapter is to provide a literature review on data research, defense economic theories and their limitations, and on recent financial and defense related publications to explain the relevance of this thesis.

### **A. DATA RESEARCH**

As this thesis is strictly based on economic metrics of financial data, the following section will highlight the difficulties in collecting defense related data and the data research that has been done. This will justify the sources of data that have been chosen for the descriptive Chapters III and IV as well as for the databases that were created as input for the regression models being used in Chapter V.

#### **1. Difficulties in Collecting Data on Defense Spending**

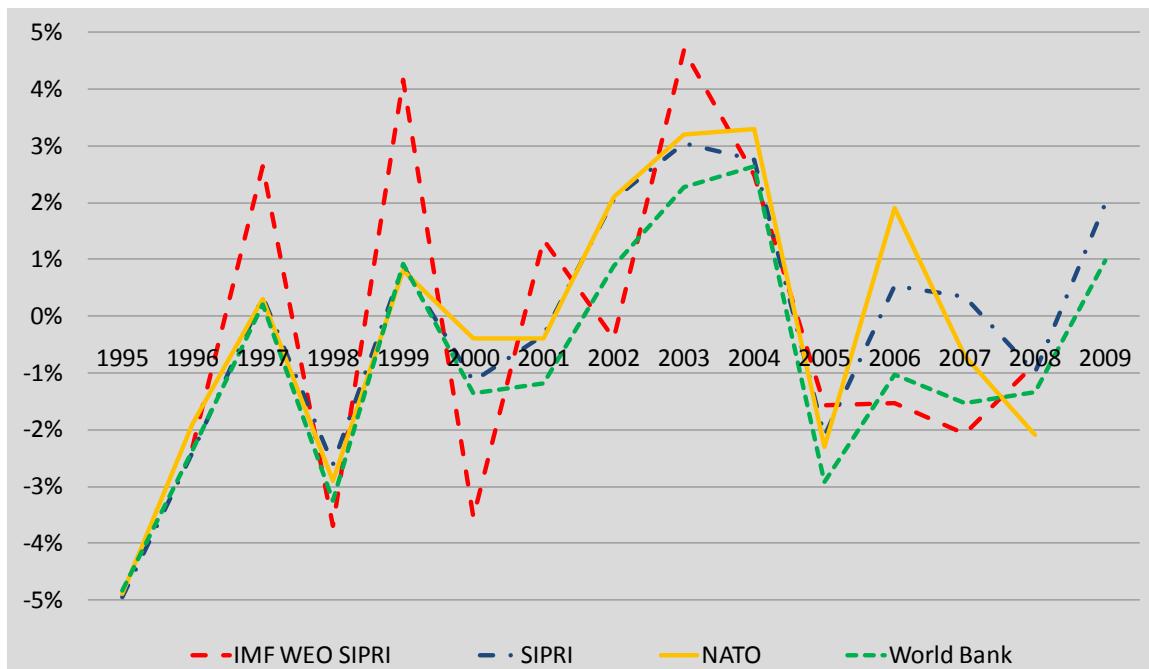
Other than financial data, like GDP or budget deficits, that are available for many countries from all over the world and of multiple sources in many different measurements, i.e., constant or current national currencies or Purchasing Power Parity (PPP) international dollars, collecting comparable detailed data of government defense expenditures faces various limitations. According to the British Ministry of Defence,

Defence expenditure data are merely input measures which give them only limited usefulness as an indicator of military strength, capability or burden. Whilst there are standardised definitions of defence spending and accounting conventions used by international organizations...not all countries record and publish their defence spending in accordance with such definitions and conventions. Some countries' actual defence expenditure may be very different from their budgeted expenditure. Differences in national tax regimes and the treatment of pension contributions can lead to significant distortions in expenditure (Ministry of Defence (UK) 2010).

Further, "departments other than defence departments may be deemed to contribute to defence whilst some spending by defence departments can be categorised as supporting other activities" (Ministry of Defence (UK) 2010). Finally, "the choice of conversion method...used to convert to a common currency or from current to constant



(real terms) prices can result in significantly different rankings of global defence spending” (Ministry of Defence (UK) 2010).



**Figure 1. Percentage Change in Military Expenditures to Previous Year for France.**

Data, in this case the annual percentage change in defense expenditures for France, varies largely within the available sources as can be seen exemplarily in Figure 1. As it seems to be very difficult to find correlation between expenditure data from different sources, the analysis of data has been done very carefully, always keeping the specific properties of data in mind. This is even more important when it comes to merge data from different sources. The data used in this thesis can therefore differ according to the intended goal.

In the following sections, the results of data research for this thesis will be highlighted as well as the limitations and specific characteristics that come along with the data provided.

## **2. International Monetary Fund World Economic Outlook**

There are 187 member countries of the International Monetary Fund (IMF), with the common goal to “foster global monetary cooperation, secure financial stability, facilitate international trade, promote high employment and sustainable economic growth, and reduce poverty around the world (International Monetary Fund, 2011).”

According to the IMF, it focuses mainly on “macroeconomic and financial issues (International Monetary Fund, 2011).” It works together closely with other international organizations that are dealing with the same issues but with different areas of responsibility and specialization. One close partner for the IMF is the World Bank (International Monetary Fund, 2011).

The IMF’s major publication is the World Economic Outlook (WEO), which reports analysis and projections of worldwide economic developments and which is usually updated twice a year, based on data from its members. Economic data is available from 1980 on and most projections are given for the upcoming two years. The data can be downloaded on the IMF web site using an Excel spreadsheet format. The spreadsheet can be best used to find data on national accounts, including information on unemployment and fiscal indicators. Data for GDP is converted in PPP constant international dollars and allows comparing data between different countries. This data will be used in Chapter III. No data on government expenses by function is available using this data source.

## **3. The World Bank**

The World Bank pictures itself as “a vital source of financial and technical assistance to developing countries around the world (World Bank, 2011).” Its mission is to reduce poverty in the world in a passionate and professional way. The goal is to achieve “lasting results and to help people help themselves and their environment by providing resources, sharing knowledge, building capacity and forging partnerships in the public and private sectors (World Bank, 2011).”

In contrast to the IMF, the World Bank is concerned mainly with longer-term development and poverty reduction by making loans available to foster infrastructure projects. Only members of the IMF are eligible to achieve a World Bank membership (World Bank, 2011).

The World Bank offers open data sources in several data sets that can be exported to Excel. The datasets are compiled from international sources and show data respecting global developments, including estimates. The data set used in Chapter IV Sections A and C is derived from the World Bank's World Development Indicators (WDI) collection as it includes data on GDP and deficits as well as on total expenditures<sup>1</sup> and defense expenditures<sup>2</sup>.

#### **4. Organization for Economic Cooperation and Development (OECD)**

The OECD was established in 1947 to execute the U.S.-financed Marshall Plan to help Europe to recover from World War II. After the success of the Marshall Plan, it is still the OECD's mission today "to promote policies that will improve the economic and social well-being of people around the world (Organisation for Economic Co-operation and Development, 2011)."

According to the OECD, it understands itself as a "market place where governments can exchange knowledge and experiences to find solutions for common problems by understanding economic, social and environmental influences (Organisation for Economic Co-operation and Development, 2011)."

The OECD data is derived from its member countries and analyzed and compared to predict trends. The OECD sets further international standards and its data offers the best data source for displaying government expenditures by functions as it will be shown in Chapter III. The data on military expenditures differs significantly from other primary sources for defense expenditures, i.e., SIPRI/NATO, as can be seen in Figure 1.

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<sup>1</sup> Based on IMF, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.

<sup>2</sup> Derived from Stockholm International Peace Research Institute (SIPRI).

## **5. Stockholm International Peace Research Institute**

The Stockholm International Peace Research Institute (SIPRI), founded in 1966, is an independent international institute that focuses its research areas on conflicts, armaments, arms control and disarmament. “SIPRI provides data, analysis and recommendations, based on open sources, to policymakers, researchers, media and the interested public (Stockholm International Peace Research Institute, 2011).”

SIPRI offers compendia on defense data and analyses publicized in the annual SIPRI yearbook focusing on security and conflicts; military spending and armaments; and non-proliferation, arms control and disarmament. In contrast to GDP data that uses PPP for comparison, defense expenditures in the SIPRI yearbook are converted into U.S. dollars using market exchange rates (MER) as PPP might not reflect the cost of major weapon systems (Stockholm International Peace Research Institute, 2011). Data on military expenditures of 172 countries are available from 1988 on from the SIPRI web site in an Excel spreadsheet format. The data primarily follows government reports requested by SIPRI.

## **6. North Atlantic Treaty Organization**

The North Atlantic Treaty Organization (NATO) was founded in 1949 as an international organization to execute the North Atlantic defense alliance to offset the Soviet Union’s military predominance in the eastern parts of Europe. NATO offers annual compendia on financial and economic data, including detailed defense expenditures based on NATO definitions for its member countries from 1949 to present. As the NATO definitions may vary from national definitions, the data published by NATO may as well deviate from the data published in national budgets (NATO, Information on Defence Expenditures, 2011). The NATO defense expenditure tables can be downloaded in a PDF and Excel format.

NATO offers reliable and detailed data on defense expenditures by categories and the data correlates well with the defense expenditure data from SIPRI up to the year 2005 due to the revised NATO definition agreed upon in 2004. This new definition “excludes

expenditures on *Other Forces* that support forces and can be deployed (Ministry of Defence (UK) 2010).” For Greece, this new definition resulted in a “significant apparent decrease in defense expenditures (Ministry of Defence (UK) 2010).”

## **7. Summary**

This thesis uses data from five different sources. The sources for reliable defense data are limited and are often lacking of common definitions and standards. Therefore, the defense data for this thesis is retrieved from NATO and SIPRI only, as these institutions seemed to be the most frequently used sources for defense expenditures in defense expenditure related research. The data used in this thesis to highlight the individual country’s specific government budgets, its budget deficits, debts and economic indicators like GDP is derived from IMF, World Bank and OECD. All three sources provide easy access to the statistical data via their web sites and can be downloaded and converted into Excel spread sheets.

## **B. THEORIES ON BUDGET DEFICITS AND DEFENSE SPENDING**

This section is intended to explain the research that has been conducted on the interactions of government budget deficits and defense spending. Therefore, a discussion about the classic views on government spending reflecting fiscal and monetary policies with respect to government deficits is provided, as well as recent research in defense economics. The understanding of the related theories is crucial for enabling the reader to follow the judgments in the analytical part of this thesis, as well as the literature’s findings justifying the research that is presented in this thesis.

### **1. Theories on Government Spending, Budget Deficit and Economic Growth**

Early theories on government spending, budget deficits and economic growth were articulated by the social philosopher Adam Smith, the pioneer in political economy. He investigated the annual government budget balances, either resulting in a budget surplus or a budget deficit, and government debts, as the historically accumulated net borrowings of a country’s central government that might result from running budget deficits. In his five-book series, *An Inquiry into the Nature and Causes of the Wealth of*

*Nations*, published in 1776, he explains the danger that goes along with government budget deficits that result in an accumulation of debts:

The progress of the enormous debts which at present oppress, and will in the long-run probably ruin, all the great nations of Europe has been pretty uniform. Nations, like private men, have generally begun to borrow upon what may be called personal credit, without assigning or mortgaging any particular fund for the payment of the debt; and when this resource has failed them, they have gone on to borrow upon assignments or mortgages of particular funds (Smith, 1776).

Not only does Smith see the danger in growing debts, he as well points out his theory that the more a nation increases its government debts, the more care has to be taken to avoid any misappropriation of funds:

The more the public debts may have been accumulated, the more necessary it may have become to study to reduce them, the more dangerous, the more ruinous it may be to misapply any part of the sinking fund; the less likely is the public debt to be reduced to any considerable degree, the more likely, the more certainly is the sinking fund to be misapplied towards defraying all the extraordinary expences which occur in time of peace (Smith, 1776).

Smith does not explicitly state where, when and how much a government should spend, but he definitely advocates balanced budgets. Up to John Maynard Keynes, the theory of balanced government budgets was the standard government practice. Keynes introduced the idea of deficit spending as the only method to maintain full employment during economic downturns by investing in public works and hiring the unemployed (Library of Economics and Liberty, 2008c). Thus he did not see unbalanced budgets as wrong. Keynes' theory was to provide short-term fiscal stimulus by increasing the economy's purchasing power by borrowing money from the private sector and then spending the money through public programs. "Once the economy recovered, government spending should be reduced to avoid inflation (Mitchell, 2005)."

In the mid-1950s, Milton Friedman was arguing against Keynes' theories on how to foster economic growth. According to *The Concise Encyclopedia of Economics*, Friedman's monetary theory stated that increased monetary growth would raise prices

with “small or no effect on the output in the long run,” but in the short run, an “increase in money supply would cause an increase in employment and output.” A decrease in money supply would cause the opposite effect. He introduced “the money supply rule,” meaning that, if required, the money supply by the central bank should be increased at the “same rate as the real GNP growth” to minimize the risk of inflation (Library of Economics and Liberty, 2008a). Friedrich August Hayek, who was building his economic theory models at the same time as Keynes, believed that Keynesian policies would cause inflation and the central bank would have to increase the money supply faster, causing inflation to get even higher. Already in the early 1930s, Hayek argued that the increase in money supply would decrease the interest rates. He concluded that these “low interest rates would not only cause artificially high investments as well as it increases malinvestments” and thus would “turn the economic boom into a bust (Library of Economics and Liberty, 2008b).”

Up to today, even Keynes and Hayek did not fully disagree with each other’s theories; the policy makers still find themselves divided into two mainstream groups supporting or opposing deficit (stimulus) spending and/or the size of government (spending). But according to Mitchell, “Economists will generally agree that government spending becomes a burden at some point; either because government becomes too large or because outlays are misallocated (Mitchell, 2005).”

But where should a government spend money and what is the most efficient government size, especially in situations of economic recessions? Smith early realizes “that the frugality and industry of private people can more easily repair the breaches which the waste and extravagance of government may occasionally make in the general capital of the society (Smith, 1776).”

In *The Size and Functions of Government and Economic Growth*, Gwartney, Lawson and Holcombe investigated the size of the government and economic growth based on historical statistical data. They agreed to core functions of the government that are vitally important for a country: protection of property rights and enforcement of contracts; provision of a stable and freely convertible currency; and promotion of

freedom of exchange in domestic and international markets to allocate goods, services and resources. They conclude that tax and spending policies that go beyond these core functions will become “counterproductive and may restrain economic growth (Gwartney, Lawson & Holcombe, 1998).” Based on their research, all evidence suggested that the most efficient spending point where the performance of the economy would be maximized should be at around government expenditures of 15% or less of GDP (Gwartney, Lawson & Holcombe, 1998).

## **2. Research on Defense Spending and Economic Growth**

As this thesis looks at defense solely from an economic and not from a national security point of view, this section will provide a background on research in defense economics with respect to the impact of defense spending on economic growth.

Emile Benoit uncovered in 1973 a “net positive association between defense spending and economic growth for developing economies (Anderson, 1993).” This finding raised attention as many economists at that time argued that defense spending might crowd out private and public investments and research and development (R&D) resources might be better applied to the civilian applications directly. Benoit’s finding started research activities that either tried to disprove him by studying his research work or were focusing on using new methodologies (Anderson, 1993).

According to R. Ram, the theoretical approaches for investigating the relationship of defense spending and economic growth are concentrating on two categories of effects: The aggregate supply-side effects and the aggregate demand-side effects. Aggregate supply-side theories are considering the opportunity costs or the alternatives of spending (Ram, 1993a). The arguments of the demand-side effects are related to Keynes and the positive effects of fiscal stimulus. Ram further concludes that “Defense outlays may

increase aggregated demand and due to the multiplier effect it may even raise the real output by a multiple of the magnitude of the demand increase and therefore lead to economic growth (Ram, 1993b).”



Sandler and Hartley provide a comprehensive overview over the research that has been done in the field of defense economics up to 1995. According to Sandler and Hartley, theoretical approaches that show the relationship of defense on growth “have to account for the supply-side influences like technology spin-offs and positive externalities from infrastructure and demand-side side factors like crowding-out of investments or exports (Sandler & Hartley, 1995).” They reviewed 25 literature sources where most of the theoretical models were “either supply-side models, demand-side models or a combination of both (Sandler & Hartley, 1995).” Models including defense-side influences showed that defense has a negative influence on growth. On the other hand, the supply-side models either indicated a small positive influence or no influence at all. Hartley and Sandler conclude that “the net impact of defense on growth is negative, but small (Sandler & Hartley, 1995).”

Haveman, Deardorff and Stern investigated possible effects of a “peace dividend” on the economies for major industrialized and developing countries in 1992. They concluded that a reduction in defense spending in the long run generally has a positive impact on an economy, but in the short run could result in unemployment and adjustment pressures. “In order to facilitate a smooth transition, government assistance, if deemed necessary, should be pointed in the right direction (Haveman, Deardorff & Stern, 1993).”

On the other hand, Michael Brzoska found in his research that the above-mentioned expectations in the late 1980s and the early 1990s of a peace dividend or economic growth through the civilian use of defense technology could not be met. Therefore, future “hopes for an identifiable Peace-Dividend beyond the savings from reduced defense spending should be lower than they were in the late 1980s and early 1990s (Brzoska, 2007).”

In 1992, Mintz, Huang and Heo conducted a disaggregated analysis on defense spending and economic performance. First, they found strong empirical evidence that suggested the Keynesian countercyclical use of procurement spending: “Allocations to weapon systems increase when unemployment rises and decreases when unemployment decreases.” Second, the “impact of unemployment on allocations of procurement

programs is evident with a one to two year lag.” Third, “defense spending has a delayed long term effect on the economy (Mintz, Huang & Heo, 1992).”

In 2007, Yakolev examined the growth effects of military expenditures, arms trade, and their interaction by investigating data of 28 countries over period of 35 years. He surprisingly concludes “that higher military spending and net arms exports separately lead to lower economic growth, but higher military spending seems to be less detrimental to growth when a country is a net arms exporter (Yakolev, 2007).” No country in his analyzed data set has shown a net positive effect on economic growth.

In 1991, Domke looked at fiscal constraints and their influence on defense planning. He points out that the existence of a government deficit is the most likely source for fiscal constraints. He analyzed data from 1955 to 1985 and concluded that changes in the levels of defense spending “do not follow any economic rules or theories (Domke, 1991)” and that military expenditures are rather “politically determined than economically (Domke, 1991).” Political decisions at that time seemed to be driven by security policy issues rather than fiscal constraints.

### **3. Conclusion**

The literature review shows that the general dispute on government spending that started with Keynes and Hayek is still not solved and their theories are still being reflected by politicians and researchers today. Benoit and Ram are highlighting possible positive effects of defense spending under certain circumstances, whereas Hartley and Sandler found a small, but negative impact of defense expenditures on economic growth. Yakolev’s research supports Hartley and Sandler’s conclusion. Haveman, Deardoff and Stern are arguing that a decrease in defense spending might have a positive effect on economic growth in the long run, but Brzoska states that this positive effect seemed to be smaller than anticipated. Mintz, Huang and Heo found evidence that supported the countercyclical use of defense procurement spending, whereas Domke concludes that as of 1991, military expenditures are rather driven by security policies than by fiscal constraints, i.e., budget deficits. Domke’s findings are of high relevance for this thesis as his work was the only research that included fiscal constraints, such as government

budget deficits, and their possible relationship to military expenditures. As most of the research has been conducted in the early and mid-1990s, it appears to be highly interesting if the trends and findings are still valid today.

### **C. EUROPEAN UNION'S STABILITY AND GROWTH PACT AND THE EXCESSIVE DEFICIT PROCEDURE**

This section of the literature review provides research on the European Union's Stability and Growth Pact (SGP) and the Excessive Deficit Procedure (EDP) as this is essential for understanding the ongoing government budget cuts in Europe.

The European Union's SGP, agreed on in 1997 by seventeen European Union (EU) members, is, according to the European Commission, a rule-based framework to safeguard public finances and thus create a stable European currency which consists of a preventive and dissuasive arm (European Commission, 2011b).

The preventive arm requires member states to report how they plan to achieve sound fiscal positions in the medium term. The European Commission assesses the reported national programs and delivers recommendations either by addressing an early warning to prevent an excessive deficit for a country or by using policy advices regarding the countries' fiscal policies.

The dissuasive arm of the SGP governs the EDP that will take action if a country's deficit exceeds the three percent GDP threshold. However it has to be decided whether the deficit is excessive in the meaning of the treaty before the European Council issues recommendations to correct the excessive deficit, including a time frame to do so. Noncompliance with these recommendations might include possible sanctions for the Euro area members (European Commission, 2011b).

After the financial crises in 2008 up to today, twenty-four of the twenty-seven member states of the EU are facing an EDP with the intention to help these member states with deficits above three percent of GDP to return to sound fiscal positions. (European Union, 2010) In this context, the European Commission introduced in 2008 the European Economic Recovery Plan (EERP). The EERP calls for fiscal stimulus

policies which individually depend on each member's position in terms of public finance sustainability and competitiveness (European Commission, 2010).

Germany and France have been subject to an excessive deficit procedure since 2009 and the United Kingdom since July 2008. The European Council's recommendations addressed corrective actions to be taken and Germany and France are required to bring their deficits below the three percent of GDP threshold in 2013 and the United Kingdom at latest in 2014–15 (European Union, 2010). Greece as well has been subject to the EDP since 2009 and is required to bring its deficit below the three percent GDP threshold by 2014 (European Commission, 2011a).

#### **D. CONCLUDING REMARKS ON THE LITERATURE REVIEW**

This literature review highlights the difficulties that might arise by collecting data on defense expenditures and provides justification for the data sources used. Furthermore, it gives an introduction to the classical theories on economic growth as well as the research that has been done with respect to defense expenditures and economic growth. The review shows that the general dispute on government spending that started with Keynes and Hayek is still not solved and their theories are still being reflected by politicians and researchers today with respect to balanced budgets and deficit spending. Only one source was found that discussed the relationship of government budget deficits and defense spending. Those findings conclude that no relationship between economic rules and defense spending were found during the Cold War era. This conclusion is of high relevance for this thesis, as Cold War political priorities might differ significantly from today's political priorities. The background information on the SGP and EDP help to understand the current political decisions in Europe and their influence on the current European defense budget trends as both measures limit deficit spending and are aiming to balance budgets.

Armed with the information provided, the analytical chapters will concentrate on the four countries' government expenditures and deficits and their developments in military expenditures, GDP and budget deficits. Finally, the regression analyses will

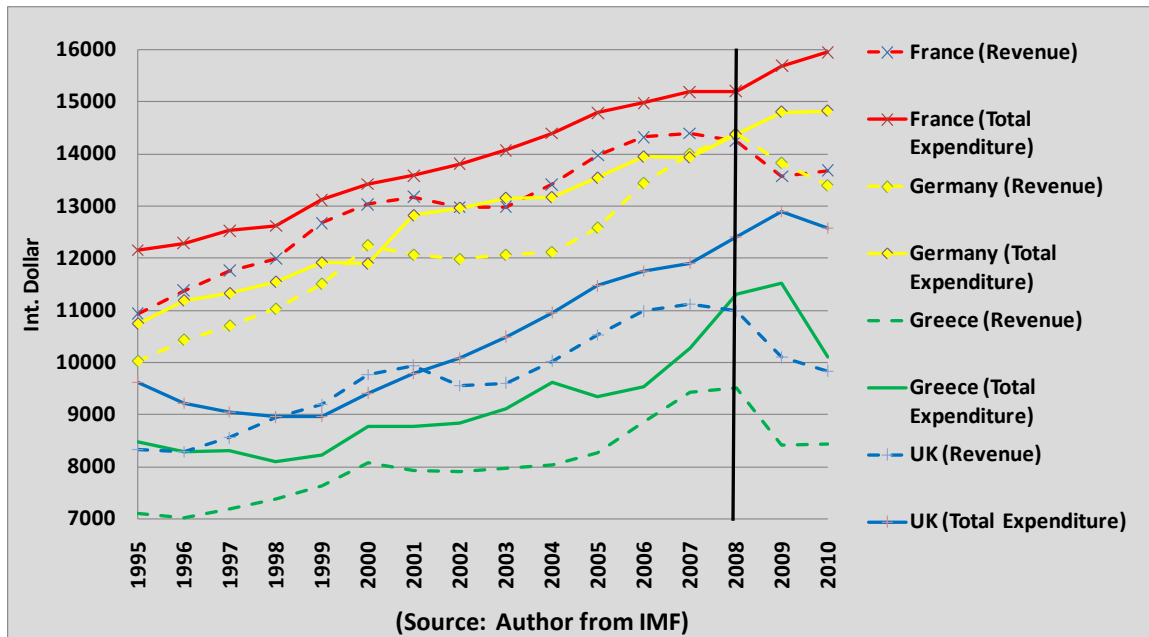
provide statistical evidence of whether previous deficits might possibly have any effect on military expenditures.

### III. GOVERNMENT EXPENDITURES AND DEFICITS

This chapter focuses on the government expenditures and deficits for France, Germany, Greece and the United Kingdom starting in 1995. The goal is to provide a background analysis and comparison for better understanding the recent budgetary developments and establish a foundation for the analysis in Chapter V.

#### A. REVENUES AND EXPENDITURES

The revenues and expenditures for France, Germany, Greece and the United Kingdom from 1995 on are displayed in Figure 2. All four countries show an upward sloping trend in revenues and expenditures up to the financial crises in 2008.

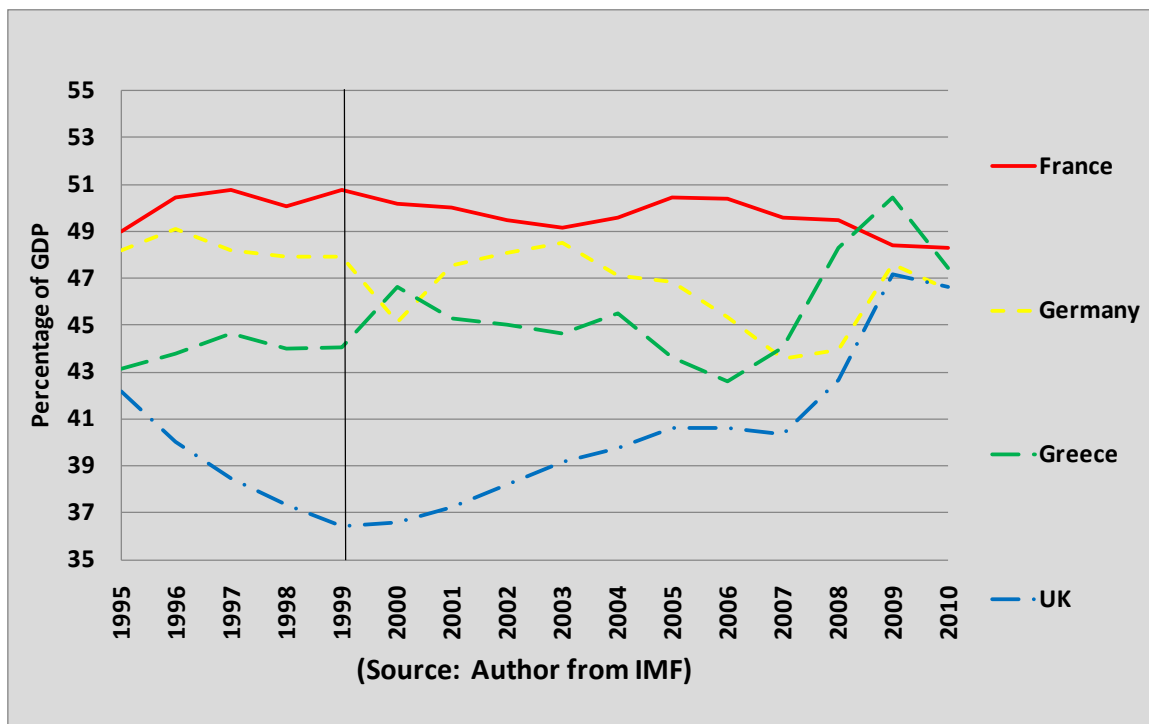


**Figure 2. Government Revenues/Expenditures per Capita based on PPP BY 2000**

Of the four selected countries, Germany and France have the highest expenditures as well the highest revenues. Germany was able to achieve a balanced budget in 2000 and 2007; the United Kingdom was able to produce a budget surplus from 1998 to 2001

but was also facing a large budget deficit in 2009. France and Greece were not able to achieve a balanced budget throughout the investigated time period.

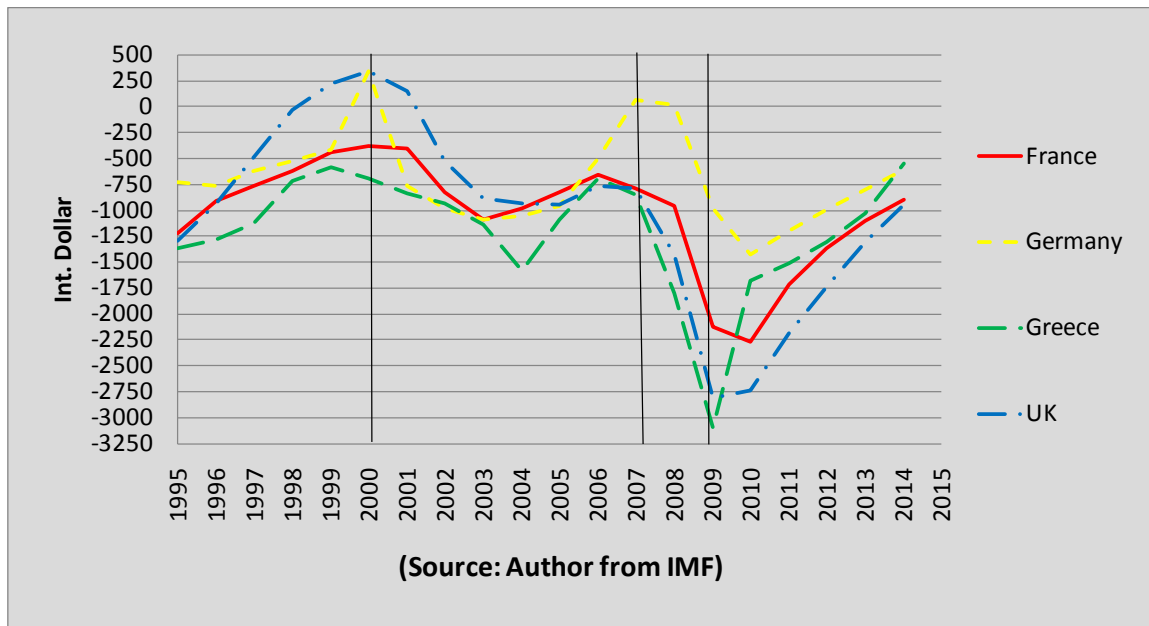
Government expenditures as percentage of GDP are illustrated in Figure 3. All levels of expenditures are well above the recommended spending level of 15 percent of GDP (Gwartney, Lawson & Holcombe, 1998). It can be concluded that the United Kingdom reduced its budget deficit by cutting expenses from about 42 percent of GDP in 1995 down to about 36.5 percent of GDP in 1999, but had to increase expenses again up to 2009 by over 10 percentage points. The increases in expenditures from 2007 to 2009 for Germany and the United Kingdom were mainly influenced due to the additional expenses for the financial aid that was given to several national banks to avoid a collapse of the national financial markets. In contrast, France was able to withstand the 2008 financial crises due to the financial robustness of its banking system (Schubert, 2011). Overall, it can be concluded that none of the four countries has currently a balanced budget and expenditures are still likely to increase due to the current Euro crisis (ZEIT-online, 2011).



**Figure 3. Government Expenditures in Percentage of GDP**

## B. GOVERNMENT DEFICITS IN PERCENTAGE OF GDP AND REAL TERMS

The government budget deficits, expressed as net lending/borrowing in real terms of France, Germany, Greece and the United Kingdom are highlighted in Figure 4. The budgets show overall the same trend, but with different magnitudes. It is striking that Germany and the United Kingdom reached a balanced budget in 2000. However, the financial burdens due to the financial crises and 9/11 seemed to have different impacts on both countries.



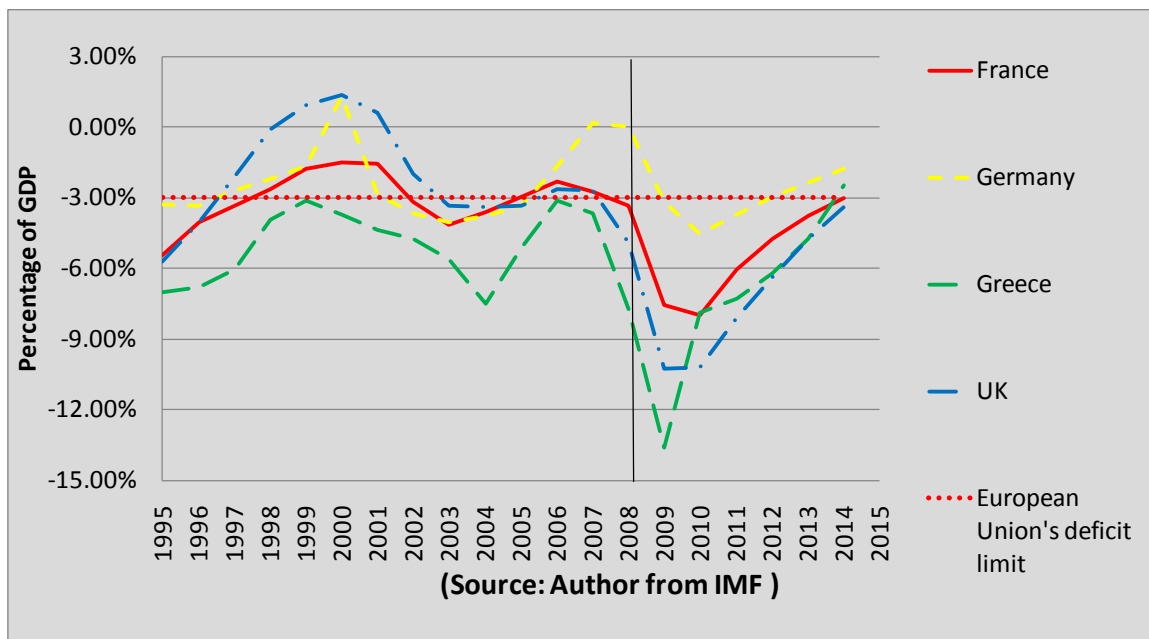
**Figure 4. Net Lending (Borrowing) per Capita based on PPP BY2000**

Germany reached another balanced budget in 2007 and 2008, but the United Kingdom found itself still in a deficit position at about the same level as the other two countries in 2007, just at the dawn of the financial crises of 2008. The United Kingdom reached its highest deficit in 2009, putting them almost into the same deficit level as Greece. Germany seemed to recover best from the financial crises due to its balanced budgets in 2007 and 2008. In the aftermath of the 2008 financial crises, it seems that the biggest impacts on the government budget deficits were reached in 2009 and 2010 with a



predicted recovery up to the year 2014. Greece's peak in 2004 was caused by additional expenditures of about € 7 B for hosting the 2004 summer Olympics in Athens (*Deutsche Welle*, 2004).

The budget deficits as percentage of GDP show a similar trend. As can be seen in Figure 5, France, Germany and the United Kingdom dropped only slightly under the European Union's three percent margin in the aftermath of the financial crises in 2001. In contrast, all countries except Germany dropped under the three percent margin immediately after the financial crises in 2008. Greece stayed below the 3 percent margin line over the length of the time period investigated.

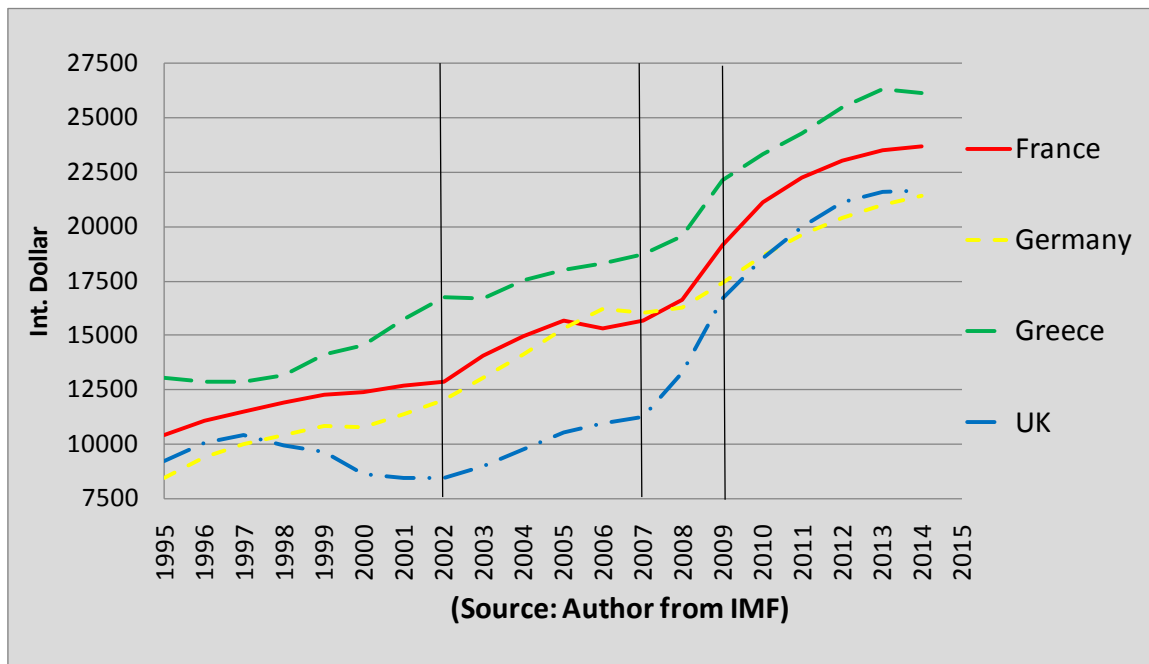


**Figure 5. Government Net Lending (Borrowing) in Percentage of GDP**

### C. GOVERNMENT TOTAL NET DEBTS

The accumulated net debts of the four countries are illustrated in Figure 6. Greece has the highest debts, followed by France, Germany and the United Kingdom. All countries, except the United Kingdom, show a steady increase in net debts over the investigated time period. Between 1997 and 2002, the United Kingdom was able to reduce its net debts significantly. However, among the four countries, the United

Kingdom had the highest increase in net debts in between 2007 and 2009 due to the “credit crunch,” putting them again on the same debt level as Germany, but well below Greece and France. In January 2008, the British newspaper *The Guardian* cited the economist Jonathan Loynes at Capital Economics, “the state of the UK’s public finances continues to go from bad to worse...there is little scope for a U.S.-style fiscal stimulus to limit the downturn in the UK economy (Seager, 2008).” However, the predicted trends in net debts from 2008 on up to 2014 are expected to follow a similar pattern for all four countries.



**Figure 6. Government Net Debt based on PPP per Capita BY2000**

#### **D. GOVERNMENT EXPENDITURES BY FUNCTION**

The development of government budgets by function in percentage of total government budget from 1995 to 2009 are highlighted in Table 1. By using a linear regression, it was possible to establish average growth rates for the given time period. Low  $R^2$  values are indicating a high level of fluctuation of expenditures within the given time period. A negative sign of the linear regression coefficient is indicating an averaged

annual decrease and a positive value is indicating an averaged annual increase in the expenditure function over the investigated time period.

**Table 1. Government Expenditures by Function as Percentage of Total Expenditures**

Government expenditures by function as percentage of total expenditures	France				Germany				Greece				United Kingdom			
	1995	2009	Lin. Regr. Coeff.	R <sup>2</sup>	1996	2009	Lin. Regr. Coeff.	R <sup>2</sup>	1995	2009	Lin. Regr. Coeff.	R <sup>2</sup>	1995	2009	Lin. Regr. Coeff.	R <sup>2</sup>
Social protection	39.5%	42.0%	0.16%	84.1%	44.7%	45.6%	0.06%	8.0%	36.4%	41.9%	0.72%	87.1%	39.0%	33.5%	-0.43%	92.5%
General public services	15.0%	12.8%	-0.19%	88.9%	13.6%	12.9%	0.01%	0.2%	23.7%	17.8%	-0.62%	86.3%	13.2%	9.5%	-0.35%	76.9%
Defence	4.7%	3.3%	-0.11%	95.8%	2.7%	2.4%	-0.02%	65.8%	8.6%	4.2%	-0.52%	95.1%	6.9%	5.4%	-0.12%	87.7%
Public order and safety	2.3%	2.4%	0.01%	31.3%	3.4%	3.5%	0.01%	46.8%	1.5%	2.5%	0.08%	30.6%	4.9%	5.4%	0.06%	59.3%
Economic affairs	7.1%	5.5%	-0.09%	78.2%	8.8%	7.6%	-0.13%	62.6%	12.7%	13.8%	-0.03%	0.3%	7.6%	10.1%	0.15%	23.7%
Environment protection	1.1%	1.6%	0.04%	98.0%	1.7%	1.4%	-0.13%	58.3%	1.2%	1.2%	0.02%	98.0%	1.1%	2.0%	0.08%	92.5%
Housing and community amenities	2.8%	3.7%	0.06%	92.8%	1.6%	1.6%	0.00%	0.3%	0.9%	0.7%	-0.03%	91.4%	2.3%	2.8%	0.05%	34.1%
Health	13.4%	14.8%	0.12%	90.6%	12.9%	14.5%	0.12%	71.8%	8.4%	10.6%	0.28%	60.1%	12.5%	15.7%	0.26%	92.5%
Recreation; culture and religion	2.0%	3.0%	0.08%	96.4%	1.5%	1.4%	-0.02%	64.7%	0.6%	0.8%	0.02%	47.2%	2.1%	2.3%	0.02%	19.3%
Education	12.2%	11.0%	-0.09%	71.9%	9.0%	9.2%	0.02%	23.5%	6.1%	6.5%	0.07%	24.7%	10.5%	13.4%	0.27%	81.2%

Source: Author from OECD.Stat Data extracted on 07 Jan 2011 21:21 UTC (GMT)

For all four countries, the expenditures for social protection make out the largest portion of the total government budget, with stable increasing rates for France and Greece. The United Kingdom surprisingly shows an opposite trend, with a significantly decreasing rate. The next two large portions of the government budget are general public services and health. Greece shows the highest spending as percentage of total expenditures for general public services, but with a decreasing annual rate of 0.6 percent. France and the United Kingdom were also able to reduce their spending in this category. The low R<sup>2</sup> values for the general public services and social protection for Germany are due to a one-time reallocation of funds between these functions in the year 2000, resulting in unusual peaks in the expenditure curves and distorted average growth rates. The spending levels for health are increasing in all four countries, with Greece and the

United Kingdom showing about the double rate of France and Germany. In contrast to the health portion, the defense expenditures as percentage of the total expenditures are the only spending category for all countries that decreased at a constant rate, with Greece having the highest and Germany the lowest decreasing rate.

The trends in the countries' budget spending functions, except for the United Kingdom, indicate the positive growth rates in the mandatory spending categories, like social protection and health care, that might constantly eat up the portion of the discretionary spending like national defense. This effect might even intensify as all four of the selected countries are subject to the European Union's EDP that forces the individual countries to decrease their deficit spending levels by reducing their total government spending.

#### **E. CONCLUSION**

France and Germany are showing almost constant increases in expenditures over the last fifteen years. Greece and the United Kingdom reduced their expenditures significantly from 1995 to 1999, but had to increase their expenditure level afterwards. The two financial crises, in 2001 and 2008, show significant negative impacts on the revenue side for all four countries. The government budget deficits for France, Germany, Greece and the United Kingdom over the last fifteen years are similar in their overall trends, but with different magnitudes. Within the given time period, Germany was able to achieve a balanced budget twice and the United Kingdom once, but over a four-year period. Only the United Kingdom was able to reduce its government net debts over a four-year period due to the decrease in total expenditures. France, Germany and Greece have almost constantly growing net debts up to 2008, and after the recent financial crisis in 2008, all countries more than tripled their net debts growth rate. The impact of the recent financial crisis in 2008 shows almost three times the increase in government budget deficits than the financial crisis in 2001. The trends in the countries' budget spending functions, except for the United Kingdom, indicate the positive growth rates in the mandatory spending categories like social protection and health care. In contrast to

the health portion, the defense expenditures as percentage of the total expenditures are the only spending category for all countries that decreased at a constant rate.

## **IV. DEVELOPMENTS IN MILITARY EXPENDITURES**

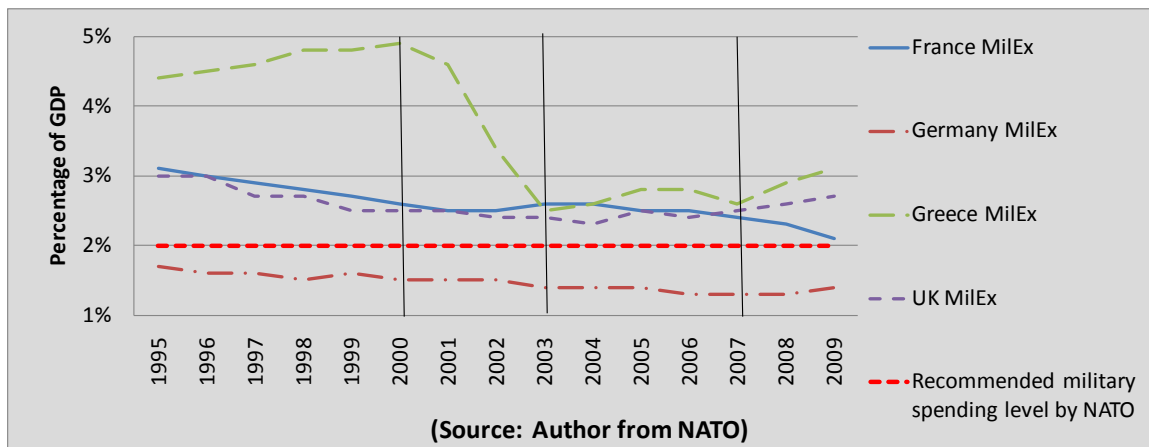
The purpose of this chapter is to provide a detailed view of the military expenditures for France, Germany, Greece and the United Kingdom. In the following, military expenditures are highlighted in either percentage of GDP or in real terms. An overview on the current defense budget trends of the four selected countries concludes this chapter. It should be noted that the previous chapter already showed that the military expenditures for all four countries are following a constantly declining trend in its portion of total government spending since 1995.

For understanding the volatile behavior of some graphs, it is crucial to point out some country-specific characteristics first, as well as some changes in the way the data was collected from NATO. The data for France includes nondeployable elements of *Other Forces* and a new accounting methodology that was used from 2006 on. The data starting in 2009 no longer includes the Gendarmerie. According to NATO, this caused a reduction in the overall force strength from 347,000 in 2008 to 243,000 in 2009. The data for Greece does not include non-deployable elements of other forces from 2002 on. Due to that, the overall force strength of Greece used in the data declined from 208,000 military personnel in 2002 to 139,000 in 2003, causing a significant discontinuance in the graphs. The defense expenditures of the United Kingdom include military pensions from 2005 on (North Atlantic Treaty Organization, 2011).

### **A. MILITARY EXPENDITURES AS PERCENT OF GDP AND IN REAL TERMS**

The NATO member states are reporting their military expenditures primarily in percentage of each country's GDP. NATO encourages its member states to spend at least two percent of their GDP on their country's military. By tying the military expenditures to the GDP, NATO takes the individual country's economic situation into account. Figure 7 highlights the trends in military expenditures in percentage of GDP for the four selected countries: France, Germany, Greece and the United Kingdom. In addition, the red dotted line at the 2 percent mark visualizes the required military spending level by

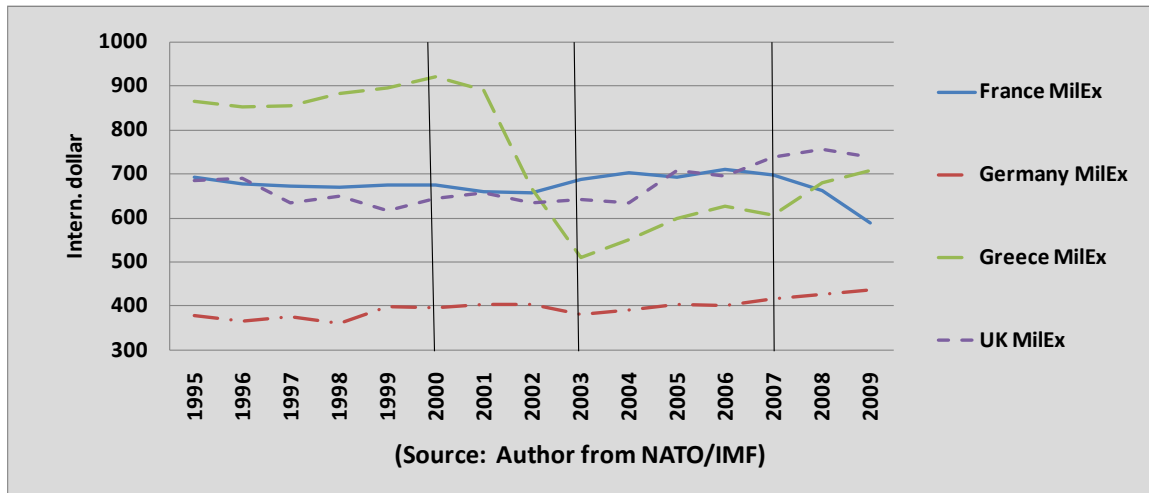
NATO. The military expenditures for France and Germany are following, on average, almost a linear declining trend, with Germany as the only country of the four selected countries well below the NATO two percent mark over the whole time period. The decrease in Greek military expenditures in 2002 and 2003 are caused by the revised NATO definition that excluded expenditures on *Other Forces*. Other than that, Greece had, on average, a constantly increasing rate in military expenditures. The military expenditures for the United Kingdom follow the same decreasing trend as France and Germany up to 2004, but “with an increase by £3.7 B between 2004/05 and 2007/08, representing 1.4% average annual real terms growth over the next three years,” to maintain the United Kingdom’s broad spectrum of military capabilities (Ministry of Defence (UK), 2005).



**Figure 7. Total Military Expenditures in Percentage of GDP**

Other than the developments for the military expenditures as percentage of GDP, the total military expenditures are, on average, increasing in real terms per capita for all four countries over the given time period as can be seen in Figure 8. France and the United Kingdom decreased their defense expenditures from 1995 to 1999/2000 but had to increase the expenditures again afterwards to maintain their military capabilities. Not only does the United Kingdom show the most significant decrease in military expenditures from 1995 to 1999, it also shows the most significant increase from 1999 up to 2008 among the four countries. Due to the exclusion of other forces from the Greek

military expenditures in 2002 and 2003, causing a significant decrease in the expenditure curve, it might well be likely that Greek military expenditures would have increased constantly as well. France shows a downward sloping trend for its military expenditures in real terms after 2006.

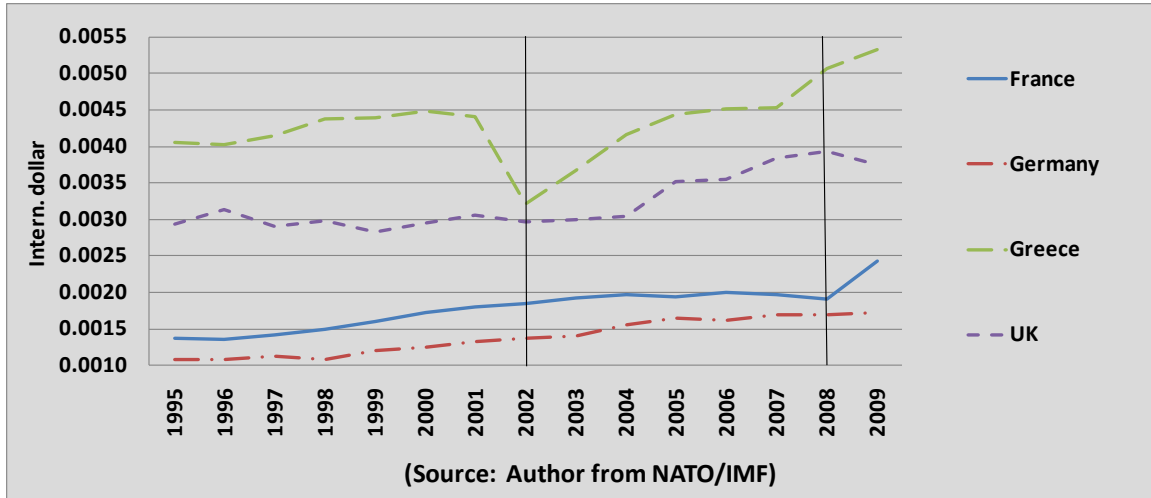


**Figure 8. Total Military Expenditures per Capita in Constant International Dollar PPP BY2000**

It can be noted that Greece dropped well below the spending levels of France and the United Kingdom after excluding expenditures on other forces from the total military expenditures.

The trend in military expenditures expressed in constant international dollars per capita per soldier show a similar behavior as the military expenditures in real terms per capita, but a difference in the spending levels according to Figure 9. France and Germany are spending a similar amount of money per soldier, with France slightly over the German spending level. The United Kingdom is spending about three times more on its military expenditures per soldier as Germany does and Greece almost four times. This indicates that the exclusion of other forces in 2002 had no significant long-term influence on the average military spending per soldier, putting Greece well above all three other countries in its military spending per soldier.





**Figure 9. Total Military Expenditures per Capita per Soldier in Constant International Dollar PPP BY2000**

## B. MILITARY SPENDING CATEGORIES

A closer look at the military spending categories according to NATO definitions provides an understanding of the different core areas of investments of the four individual countries and explains the total military expenditures in real terms per capita per soldier.<sup>3</sup> The NATO spending categories are: Personnel, Equipment, Infrastructure and Other expenditures. Table 2 shows different spending levels as percentage of overall military expenditures on average and their average increase or decrease over the given time period.

<sup>3</sup> NATO does not provide information on the definition of the four defense expenditure categories.

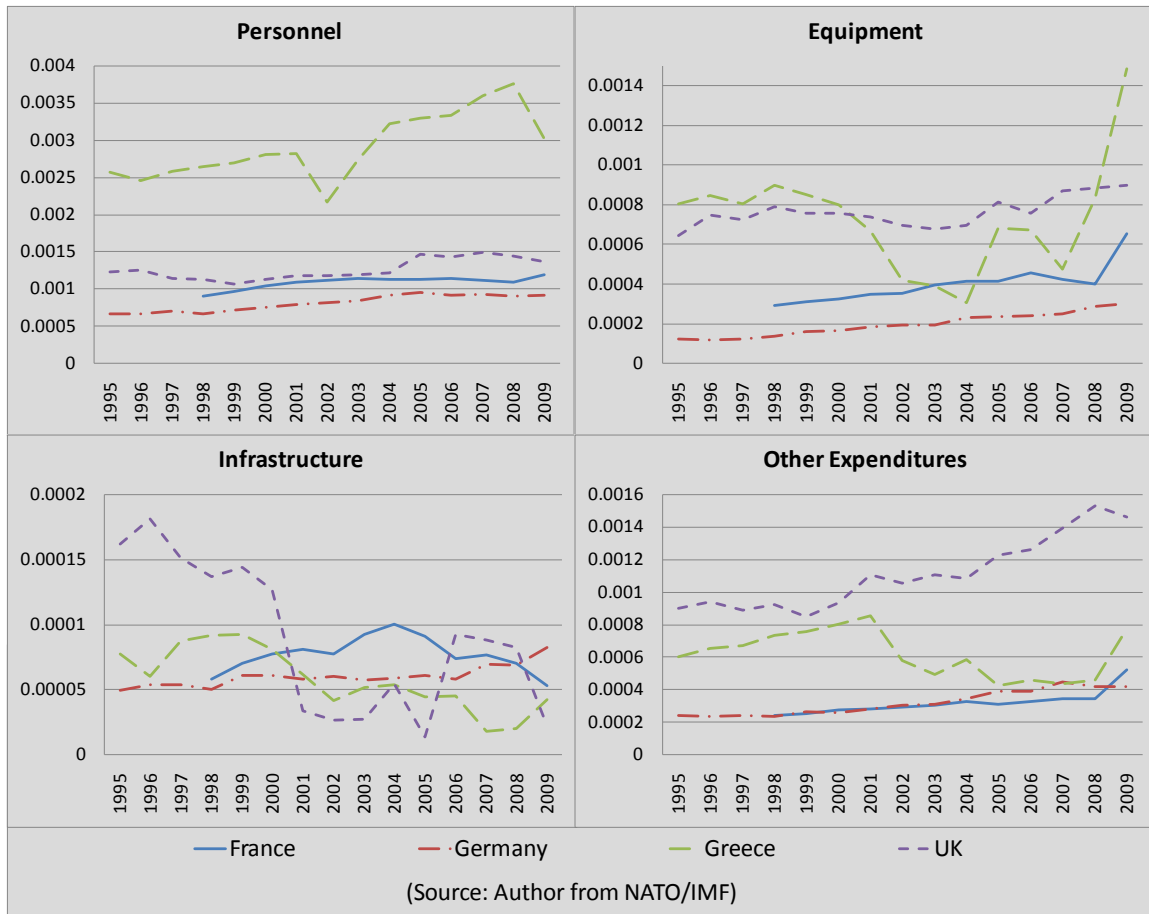
**Table 2. Average Expenditures per Category as Percentage of Total Spending**

Average expenditures per category as percentage of total spending								
	Personnel		Equipment		Infrastructure		Other expenditures	
		Incr./Decr.		Incr./Decr.		Incr./Decr.		Incr./Decr.
<b>France</b>	58.1%	-0.7%	20.9%	0.5%	4.1%	-0.1%	16.8%	0.3%
<b>Germany</b>	58.2%	-0.6%	14.6%	0.4%	4.3%	-0.1%	23.0%	0.3%
<b>Greece</b>	68.8%	0.9%	15.8%	-0.3%	1.3%	-0.1%	14.2%	-0.5%
<b>United Kingdom</b>	38.8%	-0.1%	23.8%	-0.2%	2.2%	-0.4%	35.1%	0.6%

Source: Author from NATO/IMF

France's and Germany's contributions and developments on personnel and infrastructure are almost the same, with small deviations in their contribution towards equipment and other expenditures. The opposite can be found by looking at Greece and the United Kingdom. Greece shows that, on average, 68.8 percent of their military spending goes to personnel, with an annual increase of almost 1 percent per year, but the United Kingdom shows by far the lowest contribution towards personnel with 38.8 percent, but the largest portion with 35.1 percent on other expenditures with an average increase of 0.6 percent per year.

The graphs in Figure 10 are showing the spending categories in more detail. Greece spends, on average, more than double the amount of money in real terms per soldier on personnel as the other three countries. France, Germany and the United Kingdom are following the same increasing trend, with Germany spending the least amount of money on personnel among the four countries. Therefore, it seems to be a logical step that Greece reduced their spending level on personnel after 2008.



**Figure 10. Military Expenditures by Category per Capita per Soldier in Constant International Dollar PPP BY2000**

The expenditures on equipment are drawing a different picture. The United Kingdom is spending about three times more on equipment than Germany does. Greece shows a fluctuating trend, with a significant increase in spending in 2005/2006 and from 2007 on due to its 2006–2010 procurement plan (*Defense Industry Daily*, 2008). France, Germany and the United Kingdom are following a similar upward sloping trend with almost the same growth rates. Fluctuations in the trends might be caused due to procurement schedules of major weapon systems.

All four countries spend only between 1 to 5 percent of their total military expenditures on infrastructure, with an overall very fluctuating amount over the past fifteen years. Even with a decreasing trend in percentage of total military spending, some

countries, like France, increased their spending on infrastructure partially and Germany kept its spending level in real terms per capita per soldier at a constant positive growth rate.

Other expenditures seem to follow a constant trend up to the year 2001 for France, Germany and the United Kingdom. The United Kingdom shows the highest expenditures among the four countries with a significant increase from 2001 on. France and Germany increased their expenditures slightly from 2001 on and are showing almost identical expenses. Greece's other expenditures seem to decline from 2001 up to 2009 to offset the high costs on personnel.

Greece has the highest level of total military expenditures per capita per soldier in real terms and in percentage of GDP. By looking at the four expenditure categories, it can be concluded that Greece generates high costs on personnel, but the United Kingdom, as the only country of the four countries that is involved in the Operation Iraqi Freedom and Afghanistan, shows the highest costs in supporting activities for deployed forces, like equipment and other expenditures. France and Germany show very similar trends in all four categories and are both about equally engaged in military missions, i.e., in Afghanistan.

## **C. CURRENT DEFENSE BUDGET TRENDS**

### **1. French Defense Budget Trends**

According to the Atlantic Council, the French 2010 defense budget amounted to \$53.36B, which is equal to two percent of the French GDP (Kordosova, 2010). The 2011 defense budget has a value of \$52.23B, indicating a decrease in the defense budget of 2.12 percent compared to the previous year. The French approach to savings is to cut the military personnel by 54,000 soldiers and to delay the implementation of major weapon systems, including command and control systems, land armament modernization and aircraft upgrades and acquisitions (Kordosova, 2010).

The French government recently approved a defense budget that will increase by one percent in real terms between 2012 and 2025, but this increase might not be

“sufficient to sustain the kind of modernization program” for the military that the French government just recently agreed on (Tomio, 2010).

## **2. German Defense Budget Trends**

Germany’s defense budget in 2011 is estimated to be \$43.3B as stated by the Atlantic Council. Compared to the 2010 defense budget of \$42.7B, equal to 1.27 percent of GDP, this is an increase in the defense budget by 1.4 percent. However, it is planned to cut the German defense budget by \$10.6B by 2015–2016, which is going along with a reduction of military personnel from 252,000 to 165,000 while increasing the sustainable deployable troops from 7,000 to 14,000 (Kordosova, 2010).

Meanwhile, “almost half of the 2011 defense budget will be spent on personnel and procurement spending which is expected to increase by 3.2 percent compared to the previous year. The costs for the nine ongoing foreign operations are absorbed by the defense budget, bringing additional pressure to bear on the German defense investments (*Defense Talk*, 2010).”

## **3. Greek Defense Budget Trends**

Greece reduced its defense budget from \$8.72B in 2010, equal to 3.1 percent of GDP, to \$8.16B in 2011 and compared to the previous year this is a decrease in military spending of 6.4 percent (Kordosova, 2010). In addition to the fiscal measures that have to be taken by Greece to correct its budgetary imbalance, Greece has been requested by the European Council to adopt structural measures as well, including national defense (Eurogroup, 2010).

According to *Defense Talk*, a global defense and military web portal, the primary problem in the Greek defense budget are the liabilities that come along with two procurement plans. The money for the first procurement plan (2006–2010) has already been used to pay off debts for equipment that has been previously procured. The money for the second plan (2011–2015) will likely be used to pay off already existing debts, too. As mentioned by *Defense Talk*, the “IMF insisted that the Greek defense investment will be reduced under the austerity measures that were part of the agreed-upon financial

bailout.” But because of the current modernization programs and the required air and sea surveillance, “it is expected that the defense budget will not fall much more than 10 percent over the next three years (*Defense Talk*, 2010).” However, a reduction in the delivery of military equipment by at least € 500 M compared to 2010 is planned (European Commission, 2011a).

#### **4. United Kingdom’s Defense Budget Trends**

The Atlantic Council lists the United Kingdom’s defense budget for 2010 with \$57B, equal to 2.7 percent of its GDP. Further, a reduction for the 2011 defense budget compared to the previous year by 4.2 percent down to \$54.6B is planned. Those savings shall be achieved by decommissioning ships, including the recent retirement of flagship aircraft carrier *Ark Royal*, mothballing the Harrier aircraft and dropping the planned Nimrod MRA4 Reconnaissance Aircraft along with a delay of the commissioning of the Trident submarines. In addition, 20,000 troops are planned to be withdrawn from Germany until 2020. Cumulated budget cuts by eight percent over the next four years are expected (Kordosova, 2010). According to *Defense News*, the United Kingdom might even anticipate cutting its defense spending up to 20 percent over the upcoming years (*Defense News*, 2010).

As with many other European countries, the United Kingdom is “facing an unprecedented budgetary crisis (Tomio, 2010)” due to its growing government deficit that is expected to have significant impacts on all facets of its armed forces that are already branded by foreign operations and underfunded budgets (Tomio, 2010). Consequently, its recent *Defence Green Paper* is mentioning possible closer defense ties with France to offset some possible future capability shortfalls (Tomio, 2010).

#### **D. CONCLUSION**

Besides variations in GDP and budget deficits, France, Germany and the United Kingdom seemed to contribute an almost stable percentage of GDP for military spending up to 2003/2004, but at a small and constantly decreasing rate. Among the four countries, Greece has the lowest GDP per capita, but the highest military expenditures in

percentage of GDP. Similar military spending levels for Greece and the United Kingdom as well as France and Germany, can be found by comparing the four countries' expenditures in constant international dollars per capita per soldier. France and the United Kingdom, as well as Germany and Greece, spent similar amounts of money on the individual soldiers when compared by their military expenditures expressed in constant international dollars per capita. In both cases, the United Kingdom has the highest military expenditures and Germany spends the lowest amount of money on military expenditures. Greece generates high costs on personnel, but the United Kingdom shows the highest costs in supporting military activities for deployed forces, like equipment and other expenditures. France and Germany show similar trends in all four categories.

As all of the four selected countries are recently undergoing significant budget cuts but still have to fulfill their military obligations, the focus of all countries is to achieve significant amounts of savings. France and Germany are planning to reduce costs for personnel by reducing their overall armed forces strength. Greece is required to reduce its military procurement and the United Kingdom is trying to achieve savings by early decommissioning of aged weapon systems and equipment, delaying or canceling procurements, withdrawing troops and fostering defense co-operations.

## **V. ANALYSIS OF MILITARY EXPENDITURES WITH RESPECT TO DEFICIT GROWTH**

The previous chapters introduced the four selected countries: France, Germany, Greece, and the United Kingdom, with respect to their government budget developments and military expenditures over the last fifteen years. The individual trends have been highlighted and explained. In this chapter, the military expenditures with respect to deficit growth are analyzed. First, a graphical analysis is performed by comparing the budget deficit trends of the four countries with their trends in military spending. Second, deficits and military expenditures for four different time periods and for a larger number of countries are investigated using a fixed effects regression with six different models. The goal is to determine if there is a relationship between the government budget deficits and the military expenditures for the four countries in detail and then use the regression analysis to look at the average behavior of military expenditures and budget deficits using a statistically broader approach.

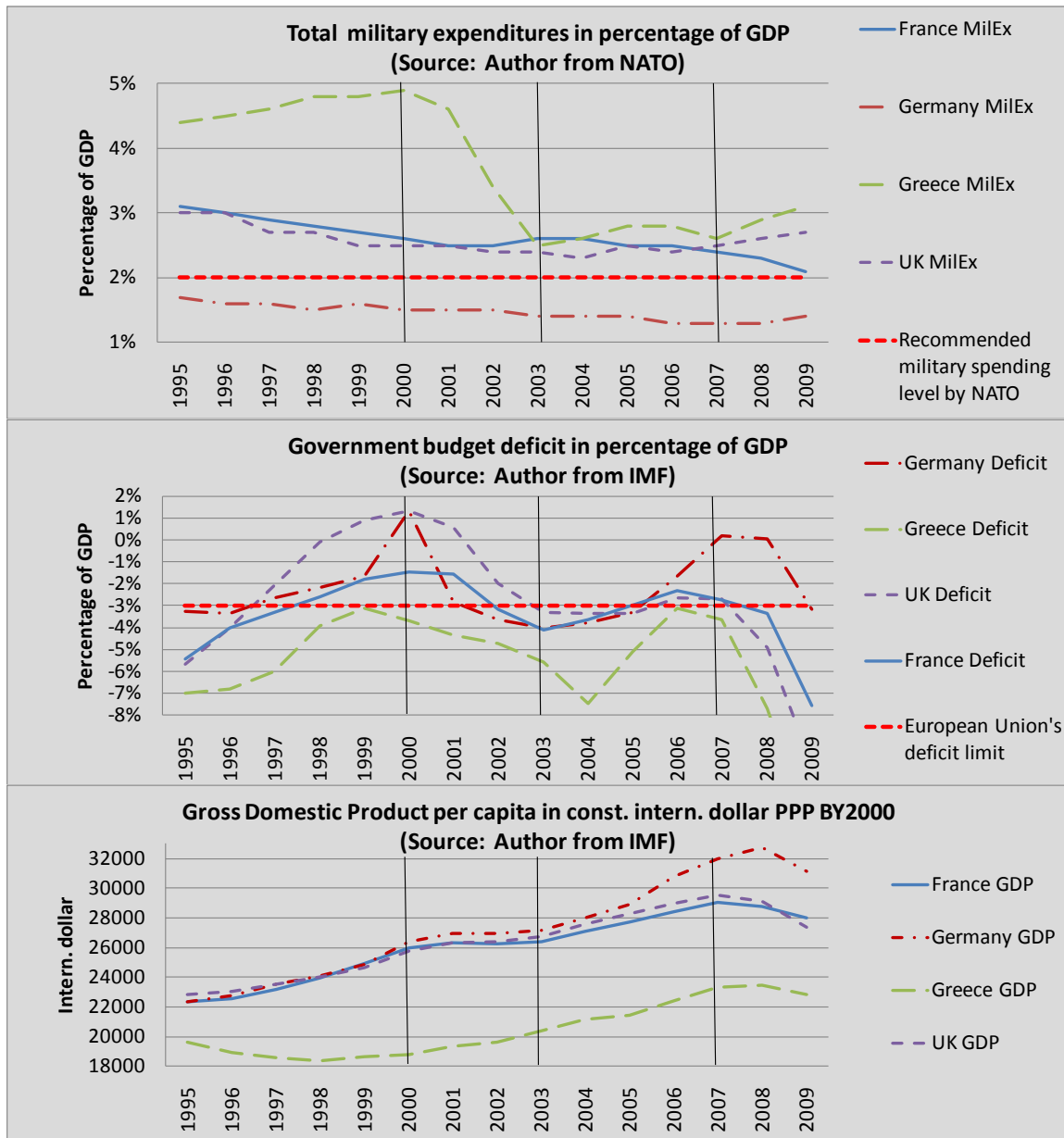
### **A. GRAPHICAL ANALYSIS FOR FRANCE, GERMANY, GREECE AND THE UNITED KINGDOM**

#### **1. Analysis of Military Expenditures and Budget Deficits Expressed in Percentage of GDP**

Over the investigated time period, four trends in budget deficits can be noted in Figure 11. From 1995 to 2000, all countries show decreasing budget deficits, with Germany and the United Kingdom even reaching balanced budgets. In the same time period, all countries except Greece showed as well decreasing military expenditures. This might indicate that a possible peace dividend might have had a positive effect on the countries' economic growth and thus government budget deficits due to reduced military expenditures. On the other hand, the significant economic upturn that can be noted from 1995 to 2000 was highly influenced by the buildup of the internet bubble, with booming stock markets that were even supported and accelerated by national monetary policies (Greenspan, 1996). However, Greece starts to show increasing GDP growth rates after



1998. Greece reduced its total government expenditures significantly in 1998 and 1999, causing the Greek deficit to decrease while the military expenditures still increased.



**Figure 11. Comparison of Military Expenditures and Budget Deficits (in Percentage of GDP) and GDP**

Between 2001 and 2003, the economy slowed down due to the financial crises in 2001, caused by the collapse of the irrational internet bubble. Within this time period, the

economic growth of France, Germany and the United Kingdom stagnated with an almost constant GDP. Greece seemed not to be affected, as its GDP was still growing at a constant rate. Until 2003, the government budget deficits increased and Germany and the United Kingdom noted the largest change in deficit. Disregarding the military expenditures for Greece, due to the exclusion of other forces, all other military expenditures expressed as percentage of GDP decreased at the previous rate, even with a changed threat environment after 9/11. Only France increased its 2003 defense budget significantly. “This increase has been enshrined in the Military Planning Act for 2003-2008, which calls for spending of 14.84 billion euros each year to maintain and improve capabilities through delivery of new equipment (Global Security, n.d).”

From 2003 to 2007/2008, the economies again accelerated with almost the same GDP growth rates for France, Greece and the United Kingdom and with an even steeper growth rate for Germany, causing the government budget deficits to decrease. While the French and German military expenditures, on average, still decreased, Greece and the United Kingdom increased their military expenditures. From 2006/2007 on, all countries’ deficits increased, but this time also with decreasing GDP growth rates. It can be noted that immediately after the large increase in deficits, the military expenditures for all countries were still increasing, except for France.

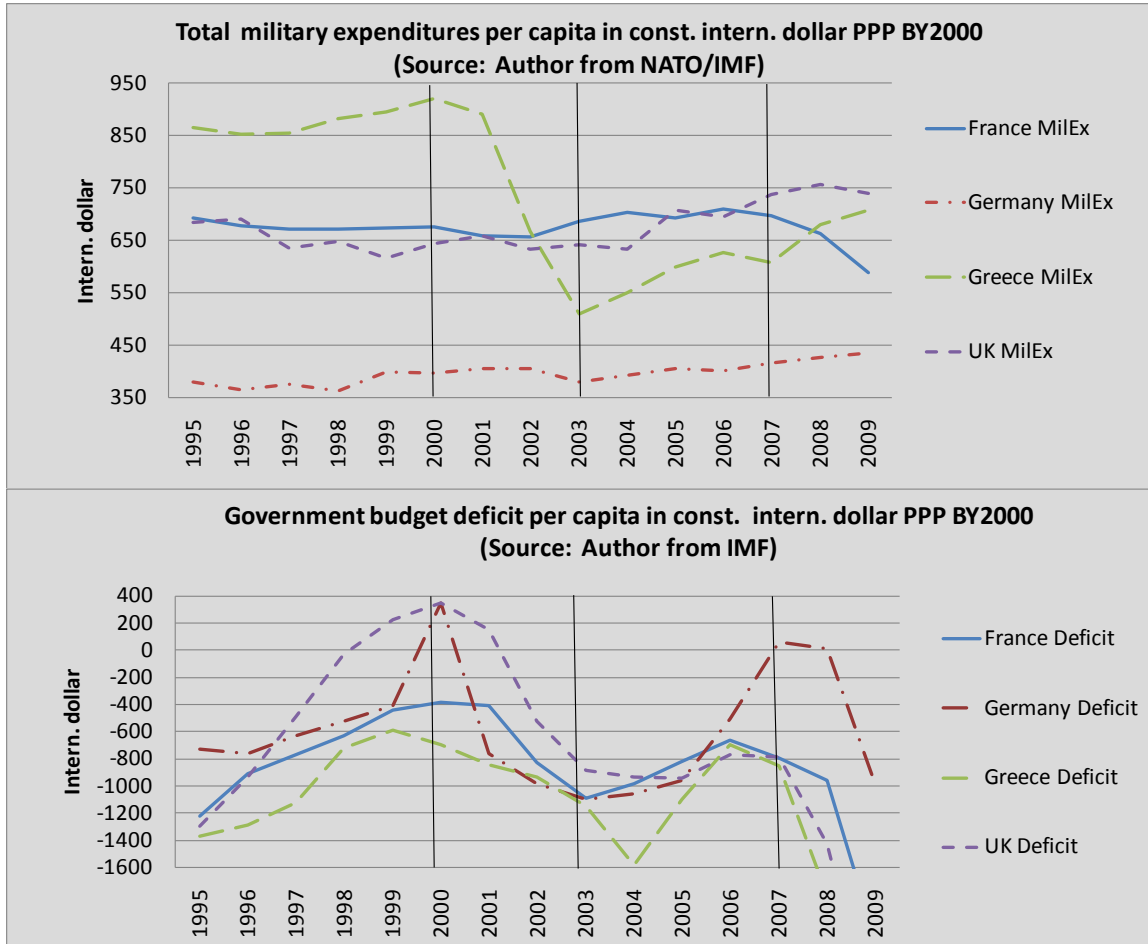
In summary, Greece has the largest government budget deficit while being over the whole time period below the European Union’s three percent limit, but has the highest military expenditures expressed in percentage of GDP. Germany, being well below NATO’s two percent limit for military expenditures, seemed to have on average the lowest government budget deficit and the best ability to recover from the 2001 financial crisis. No real interactions in government deficits and military expenditures can be noted other than that lower military expenditures in percentage of GDP might lead to lower budget deficits in percentage of GDP and vice versa. Most volatile interactions seem to be only country-specific and some changes in military expenditures are very small compared to government budget deficits, making it difficult to catch the possible reactions in a graphical analysis.

## **2. Analysis of Military Expenditures and Budget Deficits Expressed in Real Terms**

The government budget deficit/military expenditure relationship expressed in real terms per capita draws a slightly different picture, as can be seen in Figure 12. With the government budget deficits following almost the same trends as expressed in percentage of GDP but with different magnitudes, the military expenditures in real terms increased on average over the given time period. As Greece excluded expenditures on other forces after 2002, it is not possible to conclude that the Greek military expenditures really declined between 2001 and 2003.

The United Kingdom was the only country that significantly reduced its military expenditures in real terms during a period of declining government budget deficits, economic growth and a decreased threat environment but shows, together with Greece, the steepest positive growth rate from 2003 on. As stated in Chapter IV in more detail, the United Kingdom increased its military expenditures from that time on focusing on other expenditures and equipment to maintain their military obligations, but Greece increased its expenditures on personnel. Between 2003 and 2007, French military expenditures stagnated and were kept at an almost constant level but Germany kept up with almost a constant growth rate.

After 2007, France reduced its military expenditures but caution has to be paid as the military expenditures in 2009 did not include the expenditures for the Gendarmerie anymore. The next country that reduced its military expenditures following the financial crisis in 2008 was the United Kingdom. In contrast to the United Kingdom, Germany still increased its military expenditures in real terms but it has to be noted that the economic impact of the 2008 financial crisis with respect to the increase in government budget deficit hit Germany with a one-year lag compared to the other three countries.



**Figure 12. Comparison of Military Expenditures and Budget Deficits in Real Terms**

### 3. Conclusion

Four conclusions can be drawn by looking at the two different data presentations (percentage of GDP and constant international dollar) with respect to the budget deficit/military expenditure relationship. First, balanced budgets did not have any significant relationship with military expenditures. Second, except for Greece and the United Kingdom from 2005 on, military expenditures decreased, on average, when expressed in percentage of GDP but increased on average in real terms. This indicates that, except for Greece, the military expenditure growth rate is smaller than the real GDP growth rate but higher than the inflation rate. Third, the financial crises in 2001 and 2008

seemed not to have any immediate impact on military expenditures. Fourth, France and the United Kingdom show more significant decreases and increases in their military expenditures over the given time period than the other two countries. In contrast, it can be concluded that Germany seems to be quite resistant to economic or national security concerns, as Germany shows constant and almost linear growth rates in military expenditures.

In summary, it seems that government budget deficits might have had only a small negative relationship with military expenditures during the peace dividend era when expressed in percentage of GDP, except for Greece, and this relationship still continued for the United Kingdom, when expressed in real terms. On the other hand, the economic downturn after 2001 forced France, Germany and the United Kingdom to go slightly over the three percentage points of GDP deficit spending limit. Compared to the large increases in government deficits after 2008, these increases are small. However, the European Union decided in 2005, after the economic downturn in 2002/2003, to limit deficit spending for its members by introducing its SGP and EDP. Due to the recent financial crises, most of the European Union member states are facing large budget deficits and thus are subject to the EDP.

This analysis was intentionally limited to four countries and a time period of fifteen years to keep the graphical presentation clearly arranged and interpretable. Nevertheless, it is difficult to capture small changes and especially possible interactions that are following an event with a time lag by only looking at the graphical trends. Therefore, the next section uses a statistical approach to investigate possible impacts of government budget deficits on the level of military expenditures by using a larger number of countries based on two different sources for military expenditures.

## **B. REGRESSION ANALYSIS OF MILITARY EXPENDITURES WITH RESPECT TO DEFICIT GROWTH FOR NATO AND OECD COUNTRIES**

### **1. Objective and Approach**

In addition to the graphical analysis that is provided in Section A of this chapter, this section will use a statistical approach with a larger number of countries and time periods to investigate possible relationships between military expenditures and previous years' government budget balances. The regression models include observations regardless of whether they are deficits or surpluses. However, the focus of this thesis lies on the relationship of government budget deficits to military expenditures.

Within this section, the data sources and the reasoning for the selected regression method is highlighted and the justification for the chosen regression models is provided, followed by an overview of the regression results, including their significance levels, coefficient values and standard error and the general findings for the four basic models that will be introduced in Subsection 3. Further, the consistency of the data sets over the investigated time periods is highlighted and thoughts on the general findings are expressed. Before this section concludes, findings for the relationship of changes in military expenditures with respect to changes in previous years' government budget deficits are discussed.

### **2. Data and Method**

Two sources of defense expenditure data sets have been used as input data for the regression analysis, NATO and SIPRI. The regression that uses NATO military expenditure data uses fewer countries but a longer time period; the regression that uses military expenditure data derived from SIPRI uses more countries than NATO but covers a shorter time period. All data expressed in real terms has been made comparable by applying percentages of GDP to GDP data provided by the IMF in constant international dollars per capita base year 2000.

The military expenditure data set derived from NATO starts in 1975 and continues up to 2009. This data includes thirteen NATO members as of 1975, except Turkey due to the lack of available data. The year 1975 was chosen as, from this year on, all NATO

members reported their defense expenditures in percentage of GDP. The GDP in constant international dollar per capita PPP and the deficit as percentage of GDP are derived from the IMF. Additional deficit data is derived from EuroStat, the Annual Micro-Economic Database (AMECO) and Googledocs. Defense expenditures and deficits are either used as percentages of GDP or expenses per capita in constant international dollars, either as total values or difference to the previous year.

The military expenditure data set available from SIPRI goes from 1988 to 2009. Due to the limited time period, the number of countries was increased to twenty-two, including all OECD members in 1988, except for Turkey due to the same reasons as stated above. The GDP in constant international dollars and government deficit as percentage of GDP are derived from the same sources as stated above. Defense expenditures and deficits are again either used as percentages of GDP or expenses per capita in constant dollars, either as total values or difference to the previous year.

A fixed effects regression analysis was chosen for analysing the two data sets over the individual time intervals because a fixed effects regression fixes the average effect of each country and thus enables the analyst to control the average differences across the countries. The fixed effects coefficients eliminate the cross-country variation, so that only the within-country variation is left over, thus reducing potential influences for unobserved heterogeneity. The software used for analysing the above-mentioned data set is STATA vers. 10 by StataCorp.

### **3. Regression Models**

The six regression models that were selected and run for the NATO and SIPRI/OECD data sets are shown in Table 3. The time periods chosen were: 1975 to 1992 (Cold War era, only for NATO data), 1992 to 2001 (Peace Dividend era), 2002 to 2009 (Post-9/11 era) and for the whole available time period from 1975 to 2009 for NATO and 1988 to 2009 for the SIPRI/OECD countries.

Variables X1 to X3 show the independent variables. The notation X1 indicates that an independent variable *one* year prior to the dependent variable was used, X2 and

X3, respectively. The defense expenditures are treated as dependent variables and the budget deficits as the independent variables.

**Table 3. Regression Models**

#	Dependent Variable	X1	X2	X3
1	Military expenditures	Budget balance, previous year	Budget balance, two years prior	
2	Military expenditures	Budget balance, previous year	Budget balance, two years prior	Budget balance, three years prior
3	Military expenditures in percentage of GDP	Budget balance in percentage of GDP, previous year	Budget balance in percentage of GDP, two years prior	
4	Military expenditures in percentage of GDP	Budget balance in percentage of GDP, previous year	Budget balance in percentage of GDP, two years prior	Budget balance in percentage of GDP, three years prior
5	Changes in military expenditures to previous year	Changes in budget balance, previous year to two years prior	Changes in budget balance, two years prior to three years prior	
6	Changes in military expenditures (in percentage points of GDP)	Changes in budget balance (in percentage points of GDP), previous year to two years prior	Changes in budget balance (in percentage points of GDP), two years prior to three years prior	

Models 1 and 2 focus on real spending levels and will answer the question of whether the deficit levels in real dollars of the previous years show any significant relationship to the current level of defense expenditures.

Models 3 and 4 focus on budgets as a percentage of GDP and will answer the question of whether the deficit levels as percentage of GDP of the previous years show any relationship to the current level of defense expenditures as a percentage of GDP.



Models 5 and 6 focus on the reactive behavior of defense expenditures by answering the question of whether previous changes in the deficit levels show any relationship to the latest changes in defense expenditures.

The hypothesis that has been set up for the regression is that defense expenditures are affected by previous years' budget deficits. This will be answered by looking at three significance levels derived from the p-values. The lower the p-value, the stronger is the statistical evidence for the dependent variable. One star indicates a weak statistical significance of the dependent variable, if the p-values lies between 0.05 and 0.1. Two stars indicate statistical evidence with the p-value that lies between 0.01 and 0.05. Strong statistical evidence can be found if the p-value is smaller than 0.01, indicated by three stars. The stars can be found on the right side of the coefficients in Table 4. The value for the the standard error is stated in parantheses. The regression is not looking for quantitive forecasting models with high  $R^2$  values, rather it will focus on the significance levels of the independent variables to enable a qualitative interpretation of the data.

#### **4. Results of the Fixed Effects Regression and Findings (Models 1 to 4)**

The results of the six different regression models that were applied to two different data sets, NATO and OECD, with up to four different time periods can be seen in Table 4.

The table shows the results for the NATO and OECD collectives first, followed by the country collectives of France, Germany, Greece and the United Kingdom on the right side. The NATO and OECD country collectives are different in the number of countries within the collectives and the data sources for the military expenditures. In contrast, the only difference for the four selected countries' collective is the source for the military expenditures, indicated by NATO and SIPRI in the top row of Table 4.

**Table 4. Results of the Two Fixed Effects Regression Runs**

M	Dep. Var.	Indep. Var.	Unit	All countries								France, Germany, Greece, United Kingdom only							
				NATO		OECD		NATO		OECD		NATO		SIPRI		NATO		SIPRI	
				75-91	92-01	92-01	02-09	02-09	75-09	88-09	75-91	92-01	92-01	02-09	02-09	75-09	88-09		
1	Military expenditures	Budget balance, previous year	Per capita in const. intern. \$ BY2000	-.031 (.019)	-.026** (.011)	-.017*** (.006)	-.041*** (.013)	-.039*** (.009)	-.029*** (.010)	-.032*** (.007)	.001 (.035)	-.016 (.031)	-.034 (.022)	-.069* (.036)	-.139*** (.034)	-.037 (.023)	-.041* (.024)		
		Budget balance, two years prior	Per capita in const. intern. \$ BY2000	.041** (.012)	.013 (.013)	.007 (.006)	.007 (.014)	-.002 (.010)	.025** (.011)	.009 (.007)	.066* (.037)	.063** (.031)	.049** (.021)	.004 (.039)	.013 (.038)	.065*** (.023)	.056** (.026)		
2	Military expenditures	Budget balance, previous year	Per capita in const. intern. \$ BY2000	-.027 (.020)	-.027** (.011)	-.018*** (.006)	-.045*** (.014)	-.043*** (.009)	-.029*** (.011)	-.033*** (.007)	-.001 (.036)	-.015 (.026)	-.034* (.019)	-.069* (.037)	-.139*** (.034)	-.035 (.022)	-.038* (.023)		
		Budget balance, two years prior	Per capita in const. intern. \$ BY2000	.015 (.026)	.009 (.015)	.007 (.008)	.021 (.017)	.011 (.012)	.017 (.015)	.012 (.010)	.061 (.046)	.013 (.029)	.018 (.022)	.003 (.044)	.001 (.043)	.026 (.027)	.019 (.029)		
		Budget balance, three years prior	Per capita in const. intern. \$ BY2000	.031 (.020)	-.014 (.013)	.001 (.007)	-.017 (.012)	-.017 (.009)	.011 (.011)	-.003 (.007)	.009 (.040)	.087*** (.025)	.053*** (.019)	.001 (.040)	.026 (.039)	.057** (.023)	.063** (.025)		
3	Military expenditures	Budget balance, previous year	Percentage of GDP	-.034** (.014)	-.017 (.014)	-.025*** (.007)	-.043*** (.014)	-.053*** (.010)	-.010 (.014)	-.033*** (.007)	-.032 (.036)	-.006 (.032)	-.039 (.026)	-.056 (.037)	-.153*** (.039)	-.035 (.025)	-.023 (.023)		
		Budget balance, two years prior	Percentage of GDP	.033** (.014)	.025* (.014)	.007 (.007)	.008 (.015)	.003 (.011)	.033** (.014)	.007 (.007)	.039 (.039)	.062** (.028)	.052** (.023)	-.015 (.040)	-.020 (.043)	.030 (.026)	.042* (.022)		
4	Military expenditures	Budget balance, previous year	Percentage of GDP	-.032** (.014)	-.019 (.014)	-.026*** (.007)	-.045*** (.014)	-.054*** (.010)	-.011 (.014)	-.033*** (.007)	-.029 (.038)	-.010 (.027)	-.041 (.024)	-.054 (.038)	-.153*** (.039)	-.034 (.025)	-.024 (.025)		
		Budget balance, two years prior	Percentage of GDP	.018 (.018)	.015 (.016)	.004 (.009)	.017 (.018)	.003 (.013)	.018 (.018)	.005 (.010)	.058 (.046)	.007 (.029)	.016 (.025)	-.024 (.044)	-.027 (.049)	.009 (.032)	.017 (.027)		
		Budget balance, three years prior	Percentage of GDP	.018 (.014)	.027* (.014)	.005 (.007)	-.014 (.013)	-.009 (.010)	.021 (.014)	.003 (.007)	-.028 (.040)	.081*** (.029)	.052** (.021)	.020 (.041)	.014 (.045)	.029 (.026)	.033 (.023)		
5	Change in military expenditures	Change in budget balance, previous year	Per capita in const. intern. \$ BY2000	-.002 (.011)	-.034 (.070)	-.001 (.004)	-.024** (.011)	-.011** (.005)	-.010* (.005)	-.006* (.003)	.051 (.043)	.001 (.014)	-.002 (.010)	-.071* (.041)	-.041* (.020)	-.010 (.010)	-.018 (.013)		
		Change in budget balance, two years prior	Per capita in const. intern. \$ BY2000	.017 (.011)	-.109 (.079)	.006 (.005)	.025** (.010)	.014*** (.005)	.011** (.005)	.008 (.003)	.075* (.043)	-.015 (.015)	.008 (.010)	.023 (.038)	-.015 (.019)	.003 (.010)	.006 (.013)		
6	Change in military expenditures	Change in budget balance, previous year	Percentage points of GDP	.007 (.012)	-.007 (.008)	-.005 (.004)	-.026* (.015)	-.011* (.006)	-.005 (.007)	-.007** (.003)	.055 (.051)	-.003 (.017)	.005 (.012)	-.102* (.051)	-.056** (.024)	-.004 (.012)	-.009 (.017)		
		Change in budget balance, two years prior	Percentage points of GDP	.022* (.012)	.004 (.008)	.003 (.004)	.035*** (.013)	.016*** (.006)	.017*** (.007)	.007* (.003)	.078 (.049)	-.005 (.018)	-.014 (.012)	.031 (.048)	-.005 (.023)	.008 (.013)	.018 (.016)		

The stars indicate the individual significance level of the independent variable, derived from the p-values (\* less equal 10%, \*\* less equal 5% and \*\*\* less equal 1%) and the standard errors are in parantheses.

For Models 1 through 4, negative signs of the coefficient and statistical significance for the previous year’s government budget balance can be found, indicating that higher government budget surpluses in the previous year are associated with less military spending in the current year and, thus, higher government budget deficits in the previous year are associated with more military spending in the current year. Of the 56 independent variables, 22 show a strong significance level, with p-values smaller than 1

percent; 4 out of the 56 independent variables show significance levels between 1 percent and 5 percent; another 5 independent variables show significance levels between 5 percent and 10 percent. Thus, in total, 31 out of 56 independent variables, equal to 55.4 percent, indicate significant statistical evidence for a relationship between a government budget deficit and military spending. These findings might be justified by legislative inertia and contractual obligations.

Results for a deficit two years and even three years prior to the current military expenditure show, in most cases, no significant association with military spending. In a few cases, a negative relationship between a deficit two years and even three years prior the current military expenditure can be observed, indicating that higher deficit levels two or three years prior might be associated with lower current military expenditures.

#### **5. Consistency of Data Sets over the Investigated Time Periods**

The coefficients of the previous years' deficit value show almost consistently a negative sign for both data sets and all time periods. The significance level is higher for the NATO and OECD country collectives and weaker for the collective of the four countries. This must have been expected, as the sample size was significantly reduced. However, more significant results that indicate a negative relationship between the two- or three-year deficit prior and current military expenditures can be found within the data sets for the four-country collective during the Peace Dividend era than for the whole NATO and OECD country collective.

#### **6. Thoughts on General Findings**

The general findings provide counterintuitive results. A majority of results, independent of data sources and country collectives, indicate that government budget deficits in the previous year might not be associated with lower military expenditures but, in few cases, especially during the Peace Dividend era for the four-country collective, a government budget deficit with a two- or three-year lag might be negatively associated with military expenditures. This might indicate that only the four selected countries were able to react to a budget deficit within a two- or three-year lag.

## **7. Additional Findings (Models 5 and 6)**

Significant results for Models 5 and 6 can only be found for the NATO and OECD country collectives for the Post-9/11 era and weaker results for the whole investigated time period, indicating that an increasing government budget deficit in the previous year is associated with increasing military expenditures. On the other hand, an increasing government budget deficit two years prior can be associated with decreasing military expenditures, showing even higher significance levels than for the previous year's government budget deficit. The four selected countries support the findings for the Post-9/11 era with respect to the previous year's government budget deficit.

## **8. Conclusion**

This analysis used two country collectives, NATO and OECD, with two different sources for military expenditures, NATO and SIPRI. The data has been analyzed for four different time periods using six different regression models. An additional analysis was run for country collectives that included only the four focus countries: France, Germany, Greece and the United Kingdom. The goal was to investigate the relationship of government budget deficits and military expenditures using NATO and OECD country collectives and the collective of the four selected countries. Therefore, the results are only valid for the collective average, not for the individual country.

Trends in the government budget deficit and military expenditure interaction can be witnessed for both analyses but with different significance levels. Further, the collective of the four selected countries shows weaker results. That was to be expected, as the number of observations had been reduced down to the four countries. However, both analyses might indicate that military expenditures were still increasing after having had a deficit in the previous year, as well as an increasing rate of military expenditures still present after having had an increasing deficit growth rate in the previous year. Models 5 and 6 support the general findings, indicating that there might be some kind of inertia that interferes with military spending, inhibiting a quick adaption of military spending levels to government budget balances. On the other hand, a government budget deficit two or even three years prior to the current military expenditures might indicate

that only the four selected countries were able to react to a budget deficit within a two- or three-year lag. By looking at the investigated time periods, it is striking that, for the four countries, more evidence can be found indicating that government budget deficits had a stronger negative relationship with military budgets during the Peace Dividend era than for the Post-9/11 era.

In contrast to the findings in the descriptive analysis for the relationship between budget deficits and military expenditures of France, Germany, Greece and the United Kingdom, this regression analysis concludes that, on average, based on the same deficit levels, military expenditures expressed in real terms and in percentage of GDP follow the same trends.

It can be concluded that despite different country collectives and sources for military expenditures, the presented results are very consistent over the investigated time periods.

## **VI. CONCLUSION, RECOMMENDATIONS AND AREAS FOR FURTHER ACTION/RESEARCH**

### **A. CONCLUSION AND RECOMMENDATIONS**

The objective of this thesis was to examine government deficits and defense expenditures for four selected European countries: France, Germany, Greece and the United Kingdom, over a timeline of fifteen years using descriptive graphical methods, and for NATO and OECD countries with a timeline up to 35 years using fixed effects regression models. The main focus of the analytical part of this thesis was to investigate the relationship, if any, between government budget deficits and defense spending for the selected countries and historical trends for NATO and OECD countries.

The foundation for the analyses was laid by performing a literature review of the selected data sources; theories on government expenditures, including national defense; and an introduction to the European Union's Stability and Growth Act as well on the Excessive Deficit Procedure. Chapter III highlighted the economic developments for the four selected countries over the last fifteen years and Chapter IV focused on explaining their individual defense expenditures over the same time period.

The literature review highlighted the difficulties in collecting data on defense expenditures and provided the justification for the data sources used. The classical theories on economic growth as well as the research that has been done with respect to the thesis' research topic shows that the general dispute on government spending that started with Keynes and Hayek is still not resolved and their theories are still being reflected by politicians and researchers today with respect to balanced budgets and deficit spending. Domke's findings are of especially high relevance as Cold War political priorities differ significantly from today's political priorities. The background information on the SGP and EDP helped to understand the current political decisions in Europe and their influence on the current European defense budget trends as both measures limit deficit spending and aim to balance budgets.

The economic evaluation of France, Germany, Greece and the United Kingdom showed varying results. France and Germany had almost constant increases in expenditures over the last fifteen years. The two financial crises, in 2001 and 2008, showed significant impacts on the revenue side for all four countries. The government budget deficits for France, Germany, Greece and the United Kingdom over the last fifteen years are similar in their overall trends but with different magnitudes. Within the given time period, Germany was able to achieve a balanced budget twice and the United Kingdom once, but over a four-year period. The recent financial crisis in 2008 almost tripled the level of the government budget deficits compared to the financial crisis in 2001, pushing all four countries well above the European Union's deficit limit of three percentage of GDP. The trends in the countries' budget spending functions, except for the United Kingdom, indicate positive growth rates in the mandatory spending categories, like social protection and health care. In contrast to the health portion, defense expenditures as a percentage of total expenditures are the only spending category for all countries that decreased at a constant rate.

The evaluation of the four countries' military expenditures indicate that, besides variations in GDP and budget deficits, France, Germany and the United Kingdom seemed to contribute an almost stable percentage of GDP for military spending over the last fifteen years but at a small and constantly decreasing rate up to 2003/2004. Among the four countries, Greece has the lowest GDP per capita but the highest military expenditures in percentage of GDP. Similar military spending levels for the United Kingdom and Greece, as well as Germany and France, can be found by comparing the four countries' expenditures in constant international dollars per capita per soldier but with, on average, constantly increasing rates. In both cases, the United Kingdom has the highest military expenditures and Germany spends the lowest amount of money on military expenditures. Greece generates high costs for personnel but the United Kingdom shows the highest costs in supporting military activities for deployed forces, like equipment and other expenditures. France and Germany show similar trends in all four military spending categories.

As all four of the selected countries have recently undergone significant budget cuts but still have to fulfill their military obligations, the focus of all countries is to achieve significant amounts of savings. France and Germany are planning to reduce costs for personnel by reducing their overall armed forces strength. Greece is required to reduce its military procurement and the United Kingdom is trying to achieve savings by early decommissioning of aged weapon systems and equipment, delaying or canceling procurements, withdrawing troops and fostering defense co-operations.

Four conclusions can be drawn by looking at the two different data presentations, percentage of GDP and constant international dollars, with respect to the budget deficit/military expenditure relationship. First, balanced budgets did not have any significant relationship to military expenditures. Second, except for Greece and the United Kingdom from 2005 on, military expenditures decreased, on average, when expressed in percentage of GDP but increased, on average, in real terms. This indicates that, except for Greece, the military expenditure growth rate is smaller than the real GDP growth rate, but higher than the inflation rate. Third, the financial crises in 2001 and 2008 seemed not to have any immediate impact on military expenditures. Fourth, the United Kingdom and France showed more significant decreases and increases in their military expenditures over the given time period than the other two countries. In contrast, it can be concluded that Germany seems to be quite resistant to economic or national security concerns, as Germany shows constant and almost linear growth rates.

Both regression analyses delivered evidence for interaction between government budget deficits and military expenditure but with different significance levels. The collective of the four selected countries shows weaker results. However, both analyses might indicate that military expenditures were still increasing after having had a government budget deficit in the previous year and an increasing rate in military expenditures was still present after having had an increasing deficit growth rate in the previous year. The reason, therefore, might have been contractual agreements and/or the inertia in the legislative budget planning process that usually has a one-year in advance planning period. On the other hand, a government budget deficit two or even three years



prior current military expenditures might indicate that only the four selected countries were able to react to an budget deficit within a two- or three-year lag.

By looking at the investigated time periods, it is striking that, for the four countries, more evidence can be found indicating that deficits had a stronger negative relationship with military budgets during the Peace Dividend era than for the Post-9/11 era. This might partially support the findings by Domke in 1991.

This thesis concludes that interactions between government budget deficits and military expenditures are not obvious at first. The graphical analysis can give an overview and might highlight trends but seems insufficient to catch small influences, disregarding purely politically influenced decisions that are not related to economic or national security concerns. The fixed effects regression analysis, which used the same measures as the graphical analysis, can only detect average trends and is constrained by its sample size. However, the regression analysis delivered interpretable results. As the use of a regression analysis is a legitimize approach for investigating interactions within countries, it needs more detailed models to catch effects that might have been disregarded in the presented approach, i.e., military procurement contracts. Some of those effects might not even be quantifiable, i.e., the influence of elections on budget decisions. The same reasons explain why research results on economic-related topics almost always differ, as pointed out in the literature review.

## **B. RECOMMENDATIONS FOR FURTHER ACTION/RESEARCH**

This thesis underlines that the area of defense economics is a separate and highly complex research field as it depends mostly on political decisions that could be economically irrational. Therefore, defense economics have only a limited use for prediction purposes. As this research ties economic aspects and national security very closely together, it might be worthwhile to foster future research activities between the Graduate School of Business and Public Policies and the School of International Graduate Studies at the Naval Postgraduate School. As the Naval Postgraduate School offers almost unique opportunities, future research activities might focus on modeling economic and national security influences on past or even future military expenditures.

It can be concluded that the presented thesis only scratches the surface of defense economics due to its complexity. Therefore, a constant and well-established research effort should be established that directs and harmonizes future thesis work or even supports dissertations in this research environment.

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