Understanding Security: Factors Influencing National Military Expenditures
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I. Introduction

Across the globe, international terrorism is an increasingly present threat. In the last two decades, the frequency of terrorist attacks globally, often motivated by political goals or religious fanaticism, has skyrocketed. According to the University of Maryland's Global Terror Database, the number of "terrorism-related incidents" rose from 993 in 1998, to 16,860 in 2014 (University of Maryland 2018). With this evolution of global international security threats, national governments must make new decisions about the prioritization of defense spending, relative to other expenditures such as public education and healthcare.

Following the collapse of the Soviet Union and the end of the Cold War, the nature of global conflict was transformed. The apparent victory of democracy and capitalism signaled an easement of international tensions between major world powers, and the threat of a third global conflict seemed to lessen. Meanwhile, the dawn of a new era of international military de-escalation presented an opportunity for greater attention to be paid to causes beyond military defense. For example, the end of the Cold War and the collapse of the Soviet Union brought about a decline in the immediacy with which European countries had to consider global nuclear conflict.

Instead, this period of reduced military tensions provided a theoretical opening for these nations previously engaged in the Cold War to turn their attention towards alternative priorities such as economic growth, environmental protection, and diplomacy. With these shifts in national priorities came subsequent shifts in central government spending. In Europe and Central Asia, the turn of the twenty-first century marked a time of changing national budgetary priorities.

However, although the end of the Cold War signaled the start of a new era of European continental politics and diplomatic priorities, an emerging series of international security threats would soon redirect and reshape the military environment of the continent. As the first decade of the twenty-first century progressed, these emerging security threats included an increase in radical Islamic-inspired terrorism, a significant increase in migrants and refugees seeking asylum in Europe from the Middle East and North Africa, and a re-escalation of military tensions in Eastern Europe.

As the nature of armed conflict, homeland security, and counterterrorism has altered substantially in Europe since the end of the Cold War, there is great value in understanding how both political and economic factors influence the military spending prioritization of European nations. Within the economic subfield of public economics, understanding factors that influence government expenditures of any kind are important to identifying the factors that influence some of the economic phenomena that most directly impact citizens in a country.

In the case of military expenditures, the global political atmosphere that has been brought about by increased terrorism and a re-escalation of Cold War-era political and military rivalries in Europe warrants continued examination of the economic and political forces behind relative national investments in military defense. A greater appreciation of these forces, and their specific impacts, can help shape global understanding of preparations and responses to increased threats such as radical Islamic-inspired terrorism and increased tensions between Russia and it's Eastern European neighbors.

Specifically, this study will explore the theoretical impact that public perceptions have on the percentage of their central government's expenditures that are allocated for military defense. As terrorism increases globally, and new geopolitical tensions emerge and engage, it is essential to understand how the perceptions and opinions of citizens about these factors influence how their governments allocate national government spending towards military expenditures. As described later in greater detail, this study examines data from twenty-eight European countries from 2003-2014 as part of a panel data empirical analysis.

This analysis will particularly seek to examine and test the hypothesis that a statistically significant relationship exists between public perceptions about terrorism and violence, and how much central governments prioritize military spending in their budgets. It is expected that greater public concern about terrorism and political violence will correspond with greater prioritization of military spending by central governments.

II. Literature Review

In order to understand this study, and the topics addressed within it, it is essential to discuss the meaningful and relevant research that has already been done regarding national military spending. This discussion will therefore address a number of key studies that are especially relevant to the unique analysis of this paper. The context of these previous studies will provide a greater understanding of this area of study generally, and with specific concern for the original research described in this paper. In addition, this discussion will address how previous research informed the intentional formulation of the empirical econometric models that comprise the core of this analysis.

The relevant literature surrounding factors influencing national military expenditures is diverse in its focus, scope of study, and method of analysis. While some studies draw heavily on political methodologies and qualitative analysis, others take a more quantitative and econometric approach to understanding the relationship between various variables and national military expenditures. For example, some technically quantitative studies into military defense spending are budget analyses that examine national defense budgets and rely heavily on qualitative means of analyzing the data itself. These types of research can be valuable because of the insight they provide into the makeup of defense budgets and hypothesized influencing variables.

However, research in this subject area that includes linear regression analysis is inherently more directly important to informing future econometric study into defense expenditures. These studies provide direct examples of independent variables related to defense spending, and address the area of study from an economic perspective. Moreover, the findings and analysis of econometric studies provide stronger foundations for testing hypotheses related to military spending.

A great deal of the diversity in qualitative and quantitative research methods is a result of the interdisciplinary nature of research into military spending. As a form of public government expenditure, military spending is well within the subfield of public sector economics, and therefore is found in the economics academic literature. Meanwhile, the political nature of military expenditures means that it is also addressed in academic literature across the public policy, international studies, and political science disciplines. As a result, this topic of national military expenditures appears in the literature subject to the methods of analysis unique to the particular academic field of each individual study.

In addition to diversity of academic discipline and method of analysis, the literature concerning national military expenditures can also be divided between county-level studies that often rely on time series data, and international studies that analyze cross-sectional or panel data. These distinctive focuses of research are a critical, because they provide unique perspectives to the research and analysis of military spending in a state or group of states. Time series studies that focus on a particular nation of interest are valuable, because they provide targeted and detailed findings about the influences on defense spending that may be distinctive to the country of interest. In contrast, cross sectional or panel data studies provide broader understanding of variables impacting military expenditures across distinctive series of nations.

As a result of the diversity of academic literature addressing the topic of national military expenditure, a wide range of quantitative and qualitative research can be applied to inform future study in this area. In addition, the literature does not center around a universally accepted set of variables determining military expenditures, but rather addresses a multitude of unique factors of influence. These characteristics of this particular body of academic research are important to note, because they demonstrate both that this research is informed by a broad scope of prior study, and that tremendous potential for further study is present. By discussing the specific academic research that directly informed this particular study, is it possible to provide greater understanding about the background of this study and the interpretation of the subsequent econometric findings. For the purposes of this discussion, the relevant academic research will be divided between studies of a single nation and studies analyzing multiple nations.

A. Single Nation Analysis

Within the academic literature addressing factors influencing national military spending, studies that focus on factors influencing spending in individual nations is valuable in providing greater understanding regarding factors that influence military spending prioritization in a particular nation. Through individual national analysis, these studies can

provide transferable understanding and ideas about influential factors that determine the relative prioritization of military spending by national governments.

One particular single nation study in military spending that informed this present research was Elitsa Petrova's "A Review of the Expenditures on Defense of the Republic of Bulgaria for 2010-2015." Although Petrova's paper does not include econometric analysis, it presents a quantitative budget analysis of Bulgarian defense spending over a six-year period, and analyzes time series data to draw conclusions and introduce hypotheses about the factors influencing changes in defense spending levels. This study presents a meaningful basis for understanding the diversity of factors that can influence defense spending, and also highlighted specific factors that warranted further, more econometric study. According to the findings of that research, and specifically the budget analysis that served as the central basis for the overall observations, it appeared that membership polices of the North Atlantic Treaty Organization (NATO) exhibited a negative relationship with defense spending (Petrova 2015). In addition, the author also hypothesized, based on the budget analysis, that the declining investment in military and defense spending by the Bulgarian government correlated positively with declining gross domestic product (GDP) growth rates (Petrova 2015).

In the formulation of the econometric models to be used in this current analysis of factors influencing military spending by national governments, Petrova's research was meaningful and beneficial in highlighting a number of specific independent variables for inclusion into the empirical research of this paper as x-regressors. Because of the budgetary evidence of a potential negative relationship between NATO membership and national defense spending, this empirical testing will include a dummy variable for NATO membership. Additionally, the hypothesized positive relationship between GDP growth rate and military spending led to the inspiration to include annual GDP growth rate and GDP per capita as x-regressors in the econometric analysis of this study.

Beyond Petrova's quantitative budget analysis, another important study focused on military defense spending in an individual nation analyzed defense spending in Bangladesh from 1972-1998. Unlike Petrova's analysis, that study, done by Shamsur Rahman, included linear regressions and econometric interpretation of the empirical findings. Rahman's key findings indicated that greater political instability in Bangladesh led to an increase in defense spending by the national government (Rahman 2000).

In this paper, Rahman's findings will serve to inform the analysis and empirical testing done to build upon previous research. Specifically, Rahman's findings suggesting a positive relationship between political instability and national defense spending led to the particular decision to intentionally integrate a political instability measurement into the empirical models as an x-regressor.

B. Multinational Analysis

In addition to the academic literature on defense spending that focuses on individual nations as the topic of study, a number of significant papers that researched military

spending across multiple nations informed this present research. That body of multinational military expenditure research was highly valuable to this study, as it presented background on defense expenditure analysis across a series of countries, and also justified the inclusion of this study's main innovative x-regressor.

Recent research has shown that the way in which a national government comes to power can have tremendous impacts in its military spending. For example, findings show that governments in place following military coups spend, on average, more on national defense than governments that came to power through peaceful means (Kim, Kim, and Lee 2013). In addition, that same study found a statistically significant variance in military spending between governments categorized as military regimes and those categorized as democracies (Kim, Kim, and Lee 2013).

Based upon those findings, this paper sought to address any regionally relevant political factors that may play a statistically significant role in determining military spending prioritization. Because this study focused on European nations in the twenty-first century, military coups did not seem to fit as a relevant factor that could be meaningfully evaluated to examine in a European regional context. However, the suggestion that political events could lead to increased military spending inspired the inclusion of a more modern and regionally relevant x-regressor for this European study. Because increasing immigration into Europe has appeared to raise tensions regarding boarder security and terrorism threats, the empirical analysis of this paper incorporated refugee population by country or territory of asylum as an additional independent variable.

In another key multinational study, empirical research examining panel data from 157 countries from 1988-2006 found that there was a statistically significant relationship between various national government characteristics and military expenditures (Albalate, Bel, and Elias 2011). That study found that particular aspects of national governments influenced central government military expenditures. Informed by those findings, this present study also included general government final consumption expenditure, as a percentage of GDP, as an x-regressor in the empirical regression analysis. This included independent variable was chosen based on the hypothesis that total general government spending may be a key characteristic that influences defense spending by national governments.

Among other keys studies related to national military expenditures, landmark research found evidence of a statistically significant link between public opinion about defense spending and military expenditures in the United States (Eichenberg and Stoll 2003). That research went on to identify similar linkages in five other democracies, and also found numerous cases where public opinion was the most significant influence on defense spending of the variables evaluated (Eichenberg and Stoll 2003). Those findings are exceptionally meaningful, as they lay the groundwork for continued study into the relationships between public perceptions and attitudes and national defense spending.

In this present study, the relationship between public perceptions and military spending lies at the core of this innovative approach to the topic of defense expenditures. The

previous findings that public opinions in some form can be statistically significant factors influencing military spending is critical to justifying the approach of this paper to empirically analyze the relationship between public perceptions and attitudes and military spending as a percent of total government expenditures.

III. Data Description

This study focuses on factors influencing military expenditures, with the dependent variable measured as military expenditures, as a percentage of total central government expenditures (Table 1). The analysis conducted covers twenty-eight European nations from 2003 through 2014 (Table 5). This section will discuss the intentional selection of the dependent variable, the relevance of key independent variables, and the reasoning behind the selected regional and time focus. A table of descriptive statistics for the data used in this analysis (Table 1) and a table of variable descriptions (Table 2) are also included.

Within the academic literature regarding national military expenditures, the specific measurement used to study defense spending varies from analysis to analysis. However, most studies address the topic using one of three common measurements. The first measurement is total military spending, measured as a total value in either converted or local currency units, and often adjusted for inflation. The second common measurement for military spending is defense expenditure as a percentage of GDP. The third common measurement of military spending is military expenditure as a percentage of total government expenditures. For this study, how defense spending will be measured was carefully considered and chosen intentionally. For this particular study, the measurement of military expenditures as a percentage of total government expenditures was selected in order to focus on the relative prioritization of military spending in comparison to other areas of government spending (Stockholm International Peace Research Institute 2018).

As evidenced by Table 1, this percentage varies greatly across the 335 observations. For example, the minimum value included in this study, a mere 0.639 percent, was spent by the microstate of Malta in 2003. The maximum value of 40.012 percent was spent by the Republic of Georgia in 2007, the year that Russian troops finally withdrew from the last remaining Soviet-era military bases in the country. Examining military spending as a percentage of total government expenditures is valuable in this case, because of the context it provides for the priority with which nations regard national defense in a given year.

Table 1. Descriptive Statistics

Statistic	Mean	Median	Maximum	Minimum	Standard Deviation	Observations
Military expenditure (percent of central government expenditure)	5.305	4.419	40.012	0.639	4.175	335.000*
WGI Political Stability and Absence of Violence/ Terrorism: Estimate (1 year lag)	0.650	0.762	1.755	-1.513	0.635	336.000
National Population	23175264.893	9473841.500	144648257.000	398582.000	32343715.119	336.000
Refugee population by country or territory of asylum	53386.274	6265.500	960395.000	11.000	125577.136	336.000
GDP growth (annual percent)	2.043	2.042	12.344	-14.814	3.974	336.000
General government final consumption expenditure (percent of GDP)	19.843	19.635	27.935	9.764	3.185	336.000
GDP per capita, PPP (constant 2011 international $)	31963.032	32777.250	65083.259	4116.196	13547.693	336.000

*Note: Data in this series not available for Spain from 2013

Along with the dependent variable, the independent variables and the parameters of the study were chosen intentionally as well. With regard to the scope of the data observed, the decision to select twenty-eight European countries allowed for comparison and analysis within a common geographic area. Simultaneously, the time span for 2003-2014 allowed for a robust availability of data and a targeted period of interest to facilitate new analysis. Specifically, this time period allowed for the research to capture potentially significant global trends including the increase in international terrorism (University of Maryland 2018).

Table 2. Definition of Dependent and Independent Variables

Source	Series
Stockholm International Peace Research Institute (SIPRI)*	*Military expenditure (percent of central government expenditure)-* The dependent variable in this study; computed using the NATO definition of defense expenditures, which includes all armed forces and national defense expenditures, and calculated as a percentage of total central government expenditures.
North Atlantic Treaty Organization (NATO)	*NATO Membership-* (NATO) Dummy variable representing national membership in the North Atlantic Treaty Organization (NATO). Value of 0 represents a year when a nation was not a NATO member, and a value of 1 represents a year when a nation was a NATO member.
United Nations High Commissioner for Refugees*	*Refugee population by country or territory of asylum-* (REFPOP) Number of refugees given asylum by a particular nation in a given year.
Daniel Kaufmann and Aart Kraay*	*Political Stability and Absence of Violence/Terrorism: Estimate (1 year lag)-* (WGI1YRLAG) A data series of the World Bank's Worldwide Governance Indicators database. This data measures "perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism," on a scale of approximately -2.5 to 2.5. Lesser values indicate perceptions of higher likelihoods of political instability and violence (The World Bank Group 2018). Lagged by one year to account for the impact of perceptions on the following year's budget process.
The World Bank Group	*National Population-* (POP) Total number of inhabitants of a given county.
	GDP per capita, PPP (constant 2011 international $)- (GDPPPP) Measurement of GDP per capita, accounting for purchasing power parity in a nation for a given year.
	GDP growth (annual percent)- (GDPGROWTH) Percentage growth rate of GDP for a county in a given year.
	General government final consumption expenditure (percent of GDP)- (GENGOVFCEGDP) Government expenditures for the purchase of goods and services, measured as a percentage of GDP.

*Note: Data distributed by The World Bank Group

In Table 2, a comprehensive list of variables is included, along with the abbreviations used in the empirical modeling of this study, brief definitions, and source information. When deciding on x-regressors to be included in this study of factors influencing military expenditures as a percent of total government expenditures, the relevant academic literature was consulted to inform initial variable selection. In addition, a number of new, prospective independent variables were included in the analysis, in an effort to test hypotheses about their potential impact on defense expenditures and contribute to the existing body of knowledge. As noted early in this paper, the relevant academic literature informed the inclusion of a number of macroeconomic variables, including annual GDP growth rate (Table 1) and GDP per capita, adjusted for purchasing power parity and measured in constant 2011 international dollars (Table 1) (Petrova 2015).

In this study, the main innovative addition to the previous body of research on national military expenditures is the inclusion of the Worldwide Governance Indicator (WGI) aggregate governance score for Political Stability and Absence of Violence/Terrorism as an x-regressor. Produced by Daniel Kaufmann and Aart Kraay, and accessible through the World Bank as part of the WGI database, this dataset serves as a measurement of public attitudes about political stability and terrorism in nations (Kaufmann, Kraay, and Mastruzzi 2010).

This indicator, one of six topic-specific aggregate scores, is measured for each year in each country on a scale ranging approximately from -2.5 to 2.5, with lower values indicative of greater perceptions of political instability and more public concern about terrorism (The World Bank Group 2018). The inclusion of this variable is significant to the overall study, because it is used a measurement of public attitudes and opinions about political stability and violence. Table 3 shows the frequency of the observations used in this analysis, organized by the WGI score. It shows that a significant percentage, approximately two-thirds of all observations, fall within the 0.5 to 1.5 range, on the positive end of the spectrum.

Table 3. Frequency of WGI Scores for Political Stability and Absence of Violence/Terrorism, selected countries 2003-2014

Score	Frequency
(-2.5)-(-1.5)	1
(-1.5)-(-0.5)	23
(-0.5)-(0.5)	83
(0.5)-(1.5)	218
(1.5)-(2.5)	11

This data is gathered by compiling data from household surveys, commercial attitudes, and other country-specific data that could expand the understanding of the linkage between public perceptions about specific political and societal factors and a nation's fiscal prioritization of national defense. In theory, a nation with a citizenry more concerned about political violence and terrorism would be prompted to invest a greater proportion of

its expenditures into national defense. The relevant literature on military expenditures presents evidence of a significant relationship between political instability and military spending (Rahman 2000) and between public opinions and military expenditures (Eichenberg and Stoll 2003).

IV. Panel Data Regression Analysis

For this study, the core empirical analysis is based on three linear regression models formulated using the series of literature-informed x-regressors described in the preceding sections. These models serve to present empirical results about the relationship between military spending and various hypothesized influencing factors. All of these models had military expenditure as a percent of central government expenditure as the dependent variable. Each of these three models is unique in their exact formula, and will be discussed in distinctive subsections.   All three of the linear regressions were estimated using EViews9 software. Below is a full table (Table 4) of regression results for all three models.

A. Model 1

The first regression model in the empirical study, Model 1, included the full series of x-regressors that were selected for this research. The estimated equation for Model 1 is:

Model 1:

$MILEXP_{it} = \alpha_i + \beta_1 WGI1YRLAG + \beta_2 NATO_{it} + \beta_3 WGINATO + \beta_4 REFPOP + \beta_5 POP + \beta_6 GDPPPP +$

$\beta_7 GDPGROWTH + \beta_8 GENGOVFCEGDP + u_{it}$

As expressed in the formula, all eight proposed x-regressors were included in the regression for Model 1. The subsequent results of the regression for Model 1, which are also displayed in the regression results table, are as follows:

Model 1: $MILEXP_{it} = \alpha_i + (-4.9)WGI1YRLAG + (-2.5)NATO_{it} + (3.0)WGINATO + (0.0)REFPOP +$

$(0.0)POP + (0.0)GDPPPP + (0.17)GDPGROWTH + (0.08)GENGOVFCEGDP + u_{it}$

In Model 1, four out of the eight independent variables included in the model were found to be statistically significant. These variables were WGI1YRLAG, NATO, WGINATO, and GDPGROWTH. Meanwhile, the independent variables REFPOP, POP, GDPPPP, and GENGOVFCEGDP were not statistically significant. Overall, Model 1 had an r-squared value of .551, an adjusted r-squared value of 0.54, and a total n of 335 observations.

Table 4. Military expenditure (percent of central government expenditure)

	Model 1	Model 2	Model 3
Intercept	6.837218***	8.30124***	8.459***
	0.000	(0.0000)	(0.0000)
WGI for Political Instability/Violence (1 year lag)	-4.909541***	-4.953971***	-5.071***
	0.000	(0.0000)	(0.0000)
NATO Membership	-2.54233***	-2.517123***	-2.521***
	0.000	(0.0000)	(0.0000)
WGI Est.*NATO Membership	2.981947***	3.142544***	3.1836***
	0.000	(0.0000)	(0.0000)
Refugee Population	6.32e^-08		
	(0.9673)	()	()
Total Population	4.44e^-09	3.97e^-09	
	(0.5425)	(0.4828)	()
GDP Per Capita PPP (constant $)	-5.41e^-06		
	(0.7435)	()	()
GDP Growth (Annual percent)	0.170177***	0.158269***	0.156***
	(0.0001)	(0.0001)	(0.0002)
Gen. Gov. Final Consumpt. Exp. (percent of GDP)	0.083		
	(0.1261)	()	()
R-squared	0.551	0.548	0.547
Adj R-squared	0.540141	0.540854	0.541558
n	335	335	335

Note: p-values are reported in parenthesis. "*". "" and "***"**
indicate p-values less than 0.10, 0.05 and 0.01 respectively.

This model provides insightful results about the four variables in the estimated equation that were significant. WGI1YRLAG, the Worldwide Governance Indicator aggregate governance score for Political Instability and Absence of Violence/Terrorism, was significant and negative with a coefficient of -4.9. This means that for every one point increase in this governance score, an approximately five percentage point decrease in military expenditure as a percent of total government expenditure would be expected. The significance of this variable is critically important, as it serves as evidence that public opinions and attitudes about political instability and terrorism are significant to the prioritization of defense spending. This result builds upon previously published literature that first introduced a significant relationship between political instability and military spending, (Rahman 2000) and public opinions and military spending (Eichenberg and Stoll 2003).

In the case of this variable, the directionality is as important of a result as its significance. The negative sign on this coefficient supports hypothesized impact of this independent variable on military expenditures as a percent of total government expenditures. Because higher scores on the aggregate WGI scale indicate greater political stability and more positive public attitudes about the presence of violence and terrorism, the negative sign on the estimated coefficient for this variable confirms the expectation that military spending as a proportion of total government spending decreases as nations become more politically stable and citizens grow less fearful of terrorism.

In addition to the WGI aggregate score, NATO, the dummy variable for NATO membership status, was also significant and negative, with a coefficient of -2.5. This means that if a non-member state joined NATO, all other factors remaining constant, a 2.5 percentage point decrease in military expenditures as a percent of total government expenditures would be expected. This result confirms the hypothesis of a significant relationship between NATO membership and military expenditures as a percent of total government spending. In some ways, the negative sign on this variable in surprising, given that membership in a military alliance such as NATO may be expected to lead to a greater prioritization of defense. On the contrary, it is likely that, with regard to NATO, a negative relationship exists because member states feel more secure because of the alliance, and therefore spend a lesser percentage of total government expenditures on defense.

The third significant variable in Model 1 is the interactive variable WGINATO, which was created by multiplying the WGI1YRLAG variable and the NATO membership dummy variable. This interactive variable was significant and positive, with a coefficient of 3.0. The significance of this variable demonstrates that public attitudes about political instability and terrorism influence military spending differently in NATO member states and NATO non-member states. Here, the sign and the magnitude of the coefficient for the interactive variable are important to how it alters the slope, or interaction, between the WGI aggregate governance score and the dependent variable. Because the coefficient on the interactive variable is 3.0 and the coefficient on the WGI score is -4.9, in NATO member states, represented by a value of 1 for the NATO dummy variable, the coefficient describing the estimated relationship between the WGI score and military expenditure as a percent of total government expenditure is now -1.9. In other words, an increase in the WGI

aggregate score of Political Instability and Absence of Violence/Terrorism leads to a smaller decrease in military spending as a percent of totally government expenditures in NATO membership states. This tells us that these public attitudes have a greater impact on military spending in nations that are not a part of NATO. The specific magnitude of this interactive variable is important, because it is not great enough to alter the sign of the WGI coefficient, even in NATO member states. Higher WGI scores still lead to a percentage point decrease in military spending out of total government expenditures, but in NATO states that decrease is less than in non-member states.

The fourth and final significant independent variable in Model 1 is GDPGROWTH, the annual GDP growth rate. The coefficient on this variable is positive, 0.17. The magnitude is quite small, but the significance of this variable is still noteworthy. The indication of a positive, significant relationship between GDP growth and military spending as a percent of total government expenditures indicates that as a nation's GDP grows at a greater rate, it is expected that the percentage of total government expenditures devoted to defense would increase. Despite the relatively small magnitude of the coefficient, it is meaningful to observe a positive relationship between such an important macroeconomic indicator such as GDP growth rate and military spending. Further research is needed, but this relationship seems to suggest that perhaps improved economic wellbeing of a country leads to a greater focus on national defense.

B. Model 2

In the second model, Model 2, three of the independent variables identified in Model 1 were omitted. REFPOP, GDPPPP, and GENGOVFCEGDP were omitted from Model 2 because they were neither statistically significant in Model 1, nor recognized in the relevant literature as being statistically significant. Subsequently, they were omitted in Model 2 in order to examine any impact from their exclusion from the model. Model 2 was estimated with the four statistically significant variables from Model 1, along with POP, the total national population. National population was left in the equation of Model 2, despite its insignificance in Model 1, because that variable has been found significant to some studies of military expenditures in the literature (Kim, Kim, and Lee 2013). Therefore, Model 2 was estimated using the following equation:

Model 2:

MILEXP$_{it}$ = α_i + β_1WGI1YRLAG + β_2NATO$_{it}$ + β_3WGINATO + β_4POP + β_5GDPGROWTH+ u_{it}

After being estimated, Model 2 exhibited virtually no change from Model 1 in r-squared, 0.548 or adjusted r-squared 0.541. This consistency indicates that the relative fit of the estimated equations is approximately the same for Model 1 and Model 2. The coefficient results from the estimation were:

Model 2: MILEXPit=αi+(-4.95)WGI1YRLAG+(-2.52)NATOit+(3.14)WGINATO+

(0)POP+(.16)GDPGROWTH+ uit

Despite the omission of three of the insignificant variables from Model 1, little is changed in Model 2. Again, WGI1YRLAG, NATO, WGINATO, and GDPGROWTH are statistically significant, and POP is not. For the four variables that were again significant, all of their coefficients retained the sign from Model 1. Additionally, all of the coefficient magnitudes remained virtually the same from Model 1 to Model 2 for the significant variables.

C. Model 3

In the third model, Model 3, an equation was estimated with only the four independent variables, WGI1YRLAG, NATO, WGINATO, an GDPGROWTH, that were significantly significant in Model 1 and Model 2. In this model, the variable POP was omitted, along with the variables REFPOP, GDPPPP, and GENGOVFCEGDP. POP was excluded from this model, after being included in Model 2, in order to examine the results of a model using only the independent variables that were statistically significant in Model 1 and Model 2. Therefore, Model 3 was estimated in the following form:

Model 3:

$MILEXP_{it} = \alpha_i + \beta_1 WGI1YRLAG + \beta_2 NATO_{it} + \beta_3 WGINATO + \beta_4 GDPGROWTH + u_{it}$

Once again, despite the omission of a variable, there was little change in the overall fit of the Model 3 compared to Model 1 and Model 2. For Model 3, r-squared, 0.547 and adjusted r-squared 0.542 remain virtually unchanged from Model 2, continuing the trend of consistent fit of the regression across all three models. The coefficient results of the estimated equation for Model 3:

Model 3: MILEXPit=αi+(-5.07)WGI1YRLAG+(-2.52)NATOit+(3.18)WGINATO+

(0.16)GDPGROWTH+ uit

 With regard to the coefficients for the x-regressors, they remain only slightly different in magnitude, and exhibit not change in significance or sign. All four consistently significant variables, WGI1YRLAG, NATO, WGINATO, and GDPGROWTH, remain significant in Model 3.

V. Conclusion

With certainty, the changing face of global military operations and homeland security priorities in the twenty-first century are worthy of continued and focused economic study. As new security threats face modern societies, it is essential to understand what factors influence national governments to invest in their military, as a percentage of their limited resources. This study sought to study both political and economic factors that were hypothesized to influence the dependent variable, military expenditures as a percent of total government expenditures.

This research found a newly observed statistically significant relationship between the Worldwide Governance Indicator for Political Stability and Absence of Violence/Terrorism and military expenditures in the observed nations during the time frame of analysis. Specifically, this, study found the expected negative relationship, which confirmed the hypothesis that the more concerned the citizens of a nation felt about their political stability and safety from terrorism, the greater the military expenditure of their government, as a percent of total government expenditures.

In addition, the study found statistically significant relationships between the dependent variable and both NATO membership status and GDP growth rate. Finally, the statistical significance of the interactive variable included in this empirical analysis showed that the impact of public attitudes on military spending, as a percent of total government expenditures, was lessened among NATO member states. These findings are valuable, as they expand the understanding of relevant impacts on military expenditures, and create a path for future research into the relationships between public attitudes, military alliance membership status, and national military expenditures as a percentage of total central government spending.

Particularly, future expansion of this research should focus on exploring other independent variables that could be significant to military spending. Because all three empirical models exhibited similar r-squared and adjusted r-squared values, the best model for future use and study would be Model 1, because of the comprehensive makeup of all the included x-regressors. In the future, additional independent variables that could be worthwhile to include to this empirical analysis would be the additional five WGI aggregate scores for good governance, a dummy variable for former Soviet states, mandatory military service, or sub-regions of Europe, and actual occurrences of terrorist attacks. This study was successful in advancing the previous body of academic study on military expenditures, as a percentage of total government expenditures, and also includes room for meaningful future research.

V. Appendix

Table 5. List of European Nations Examined, 2003-2014

Austria
Belarus
Belgium
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Finland
France
Georgia
Germany
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Malta
Netherlands
Norway
Portugal
Russian Federation
Spain
Sweden
Switzerland
Ukraine
United Kingdom

VI. References

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