Title: The determinants of the Dutch demand for military spending

Erasmus University Rotterdam
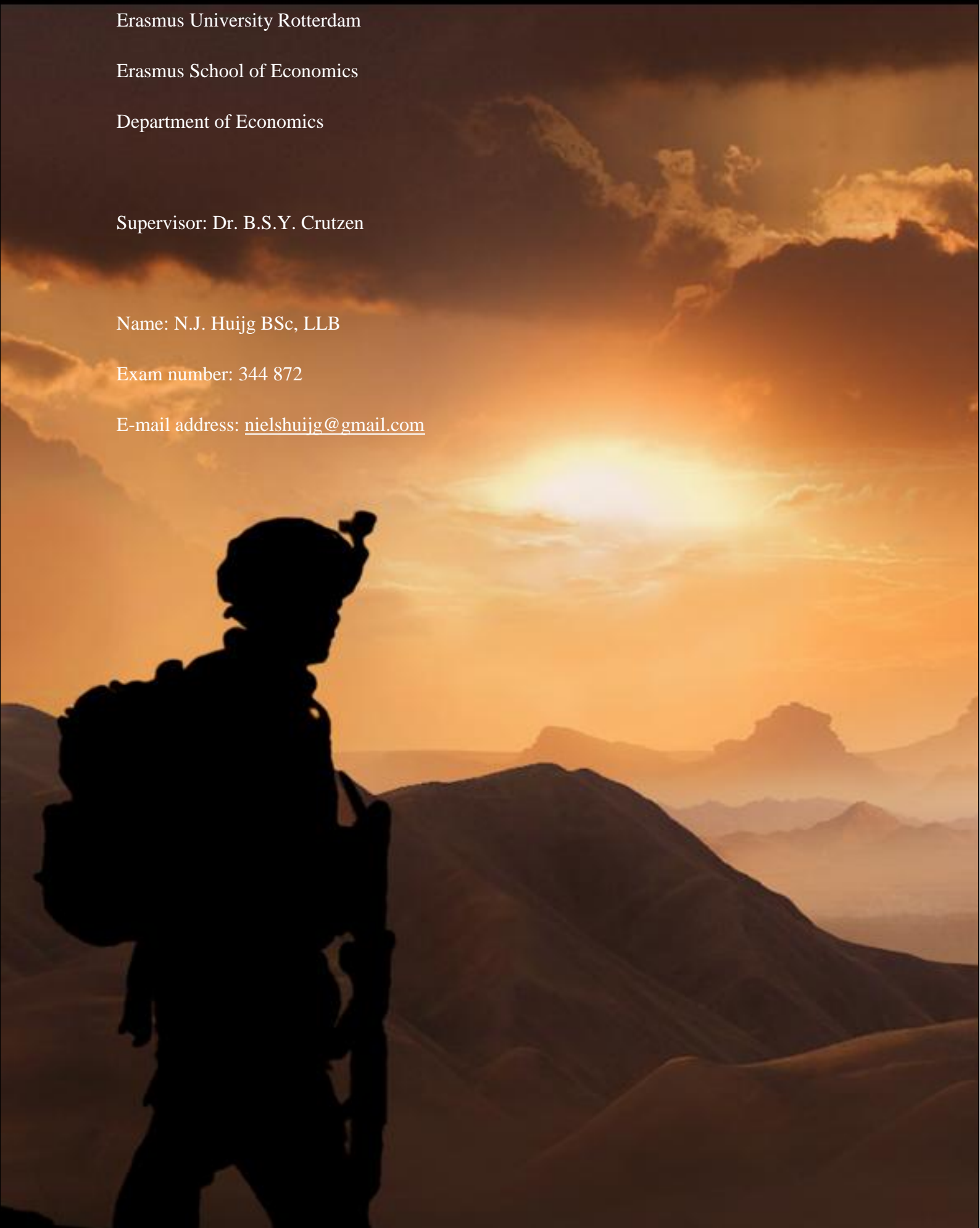
Erasmus School of Economics

Department of Economics

Supervisor: Dr. B.S.Y. Crutzen

Name: N.J. Huijg BSc, LLB

Exam number: 344 872

E-mail address: nielshuijg@gmail.com

To be prepared for war is one of the most effective means of preserving peace, George Washington (1732-1799)

Table of content

Introduction

At this point in time the world is considered to be literally on fire. Thousands of members of the Yazidi sect in Iraq face slaughtering of radical jihadists of the Islamic State (IS). As a response they have fled to a mountain in the northwest of the country, where they are threatened by dehydration and fatigue. Human tragedy strikes the Promised Land as well since the longstanding armed conflict recently intensified and claimed new casualties.

Since the Krim crisis defense politics regained importance as a political issue in the Netherlands. President Obama stated during the Nuclear Security Summit 2014 in The Hague that "Europe should increase its defense spending". Other influential people like former generals and independent analysts come to the same conclusion. Remarkable, since an era of unprecedented peace was experienced after the end of World War II. Finally, the European Union was awarded the Nobel Peace Prize in 2012.

Fierce debates in the political arena succeeded these allegations. The most powerful statement was made by the leader of the Dutch liberal party VVD: "the Americans paid for our security, while we were building up our welfare state". Or just to put it in other words, have the Netherlands indeed been free riding with the US department of defense? Other interesting questions are if Dutch defense politics are largely economically orientated and whether political assessments and safety motivations play minor roles.

The main goal of this thesis is to use a multivariate OLS regression to explain the military expenditure to GDP ratio in the Netherlands and to unravel the determinants of the Dutch demand for military spending.

The next section outlines the literature related to the determinants of military expenditures. Afterwards the data and the constructed variables will be described. Subsequently, the econometric results are interpreted and linked with theory. The last section concludes.

Related literature

Several studies have attempted to identify the determinants of military spending in developing countries. Two groups of empirical studies can be distinguished in the literature. The first kind of model presents arms increase in times of conflict in an action-reaction framework (Richardson, 1960). Although this model has been developed in a number of ways, it proved only successful in analysing the military spending of pairs of countries that are engaged in an enduring rivalry (Deger et al, 1990).

The second kind of model focuses on economic, political and strategic determinants of military spending (ratio). Some studies have developed from the neoclassical approach, which considers the state as maximizing a social welfare function, where security is an integral component produced by military expenditures (Smith, 1980). There are also case studies which are less formal in approach but which nevertheless make important contributions (Dunne et al, 2001).

The studies also vary from cross-country studies to case studies of individual countries. The cross-section model explains the differences across countries but the conclusions reached may not carry forward to differences within countries over time (Dunne et al, 2003). The panel data method allows the cross-sectional and the time-series dynamics both to be taken into account. Until now, such an analysis is only performed for developing countries. Industrialized countries that are member of stable alliance systems are excluded due to different dynamics because of possible free riding behavior (Dunne et al, 2001).

Any empirical analysis across countries is likely to encounter problems in operationalizing the wide range of factors that can influence the demand for military spending. In contrast to general features in those studies, individual case studies can pick up specific country factors (Batchelor et al, 1998).

The empirical demand functions have found mixed results and clear differences across types of countries. Some determinants of the military demand function are country specific and not amendable to generalization (Deger et al, 1990).

The peace dividend

In political science a significant distinction is made between high and low politics. The former concept covers all matters that are vital to the survival of the state and military expenditures are regarded as one of the most important priorities of the states since it enhances security. The latter concept is about the welfare of the state and the primary focus is on economics and social affairs (Ripsman, 2000).

High and low politics are interrelated with respect to the devotion of scarce economic resources. In the academic literature there is no conclusive answer to the question whether military spending cuts stimulate economic growth. On the one hand claims are made that the enforcement of property rights due to military expenditures encourages private investment and growth. Extensive transport networks originally constructed for military purposes are productive as well and military training improves the level of education (Thompson, 1974).

However, on the other hand several theories exist to reject beneficial effects from large military expenditures since it negatively affects capital formation and resource allocation. The empirical ambiguity in econometric findings is a result of the difficulty of disentangling short and long run effect from military expenditures. A Keynesian government can in the short run increase aggregate demand while in the long run military expenditures are likely to exert a negative effect on capacity output (Hewitt, 1993).

Once peace is secured and no imminent threats exits, the political focus shifts from high to low politics. In this case military expenditures cuts maximize the peace dividend: the percentage difference between the level of real capacity output per capita that would result from a given sustained reduction in the military spending ratio as compared to the baseline path of the capacity output in the absence of such reduction (Knight et al, 1996).

In their seminal work Knight et al estimate an extension of the standard growth model that includes an investment and a growth equation, both of which are functions of the military spending ratio as well as other factors. They segregated developed and developing countries since conventional wisdom suggests economic benefits from military expenditures in developing countries are different as compared to developed countries (Hewitt, 1993). In contrast to the ambiguous standard cross section estimates Knight et al find a significant peace dividend in their panel estimates. Even modest deviations in growth rates have substantial effects on the level of capacity output per worker if persisted for quite a long time.

Policy makers evidently put these lessons into practice. After the end of the Cold War the military spending ratio's for West Europe were lowest in the world, reflecting the low incidence of major armed conflicts in this region. A penny saved on defense was a penny earned for other political programs. These developments can perfectly be shown for the Netherlands in the figures below.

As seen in the second figure, the Netherlands have maintained a military spending to GDP ratio of around two percent for a long period of time. It is plausible to assume this percentage can be taken as a simple approximation of the minimum level that could be attained if lasting world peace is achieved (Knight et al, 1996). However, the "stress zones" in the world have recently extended and instability in other geographical regions is likely to affect Europe (Patomäki, 2008). During the last NATO summit in Wales these concerns were addressed by the member states and the Netherlands agreed to increase their military expenditures. This is regarded as the end of a downward trend of military expenditures (Rutte, 2014).
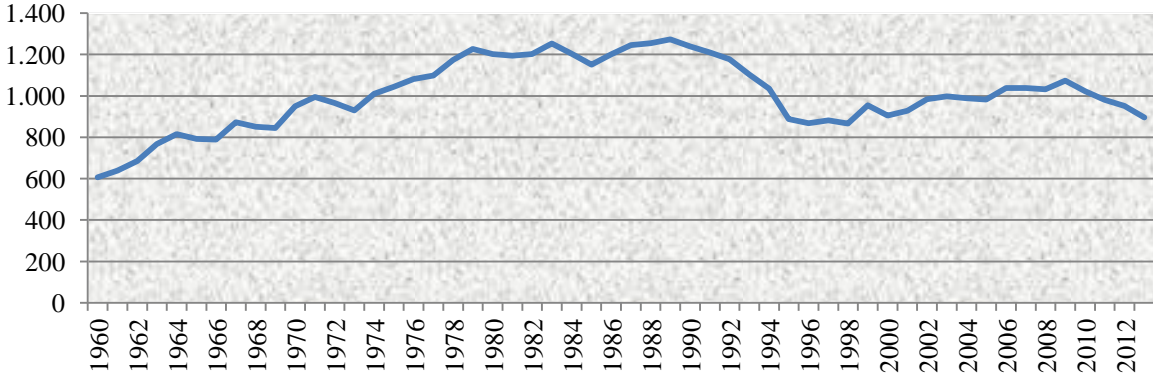
- **Figure 1: Dutch real military spending since 1960 in € millions (Source: CBS).**
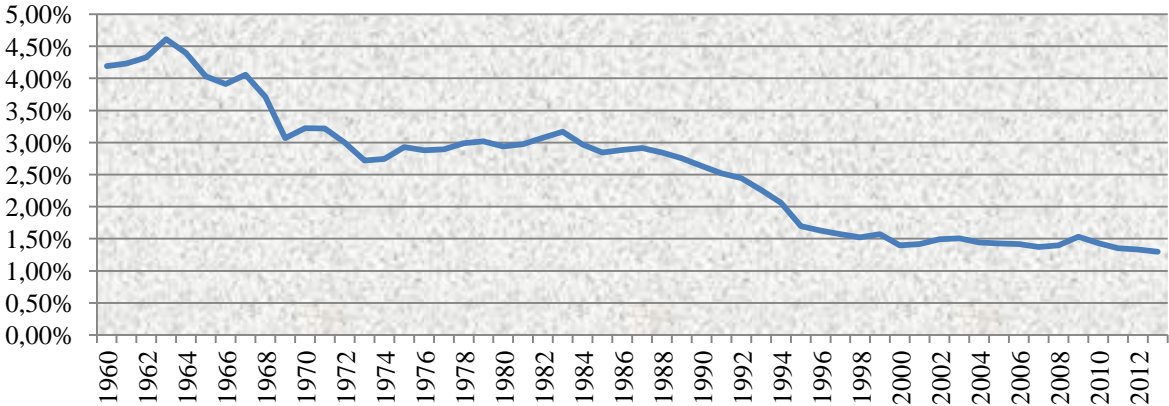
- **Figure 2: Dutch military spending to GDP ratio since 1960 (Source: CBS).**

Data and methodology

Sample period

The time span of my analysis is from the sixties until present day. The end of World War II practically marks a new era and during the first half of the fifties the Netherlands strengthened their defense system after the devastations of Nazi Germany. However, during the second half of the fifties the defense budget decreased dramatically. Since previous budgets were not completely spent and other funds were made available, these budgetary cuts are only relevant in accountancy terms. Because of the largely unique characteristics of the fifties when it comes to defense spending, this decade is excluded from my analysis.

Dependent variable

The variable of interest is military expenditure to GDP ratio as measured by the Dutch Agency for Statistics (CBS). In line with the NATO definition all costs incurred as a result of current military activities are included.

The merit of military expenditures as measurement is debated in the academic literature. Some dispute whether measures of input are superior to measures of output (Looney et al, 1990). Others point to the arbitrariness since retirement pensions of military personnel and social services for personnel are included while veterans' benefits are not. Civil defense and current expenditures for past military activities like demobilization, conversion and weapon destruction are excluded as well (SIPRI, 2014). Therefore the variable of interest is subject to some element of noise. However, the OLS estimators are unbiased and consistent since the possible measurement error of the dependent variable is uncorrelated with the independent variables (Wooldridge, 2009).

Independent variables

There are three categories of variables in my OLS regression: economic, political and strategic. Regarding the list of potential economic determinants of military spending, the data of GDP, national debt, government deficit, government spending and trade (exports + imports) is provided by CBS. GDP data is corrected for inflation (i.e. real terms) and converted into logarithms. The ratios of national debt, government deficit, government spending and trade are relative to GDP since these variables are a function of national income.

The data for the political variables is derived from CBS as well. The budget of the department of Education, Culture & Science (OCW) and the budget of the department of Social Affairs and Employment (SZW) are expressed relative to GDP. Life expectancy indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. The color of the government is related to the number of seats left wing parties have in the coalition divided by the total amount of seats of the coalition. In years of government change the coalition that is longest in office determines the ideological color of that year.

The external war dummy is constructed as a proxy for safety. It takes on value one if the Dutch military force is engaged in a conflict where the use of armed force between two parties, of which at least one is the government of the state, results in at least 25 battle related deaths (UCDP, 2013). The data is from the Department of Peace and Conflict Research of the Uppsala University.

US military expenditures are included to test whether the Netherlands have been free riding with the US department of defense. Data is reported by the Office of Management and Budget, the largest office within the Executive Office of the President of the United States. The Security Web defines neighbors and other countries that can affect a nation's security. Since Belgium, France, Germany and the United Kingdom are NATO members only the military expenditures of superpower Russia are relevant.

The military expenditures of the Soviet Union are a riddle wrapped in a mystery inside an enigma (Churchill, 1939). Data is not revealed but according to the former authorities it is not concealed because all mankind knows of the peaceable character of the Soviet government (Sosnovy, 1964). Instead, Soviet military spending is represented by the CIA estimates of what it would cost to replicate Soviet military forces in the US (Baumgartner et al, 2002).

<u>Multivariate OLS regression</u>

In order to discover the determinants of the Dutch demand for military spending a multivariate OLS regression is adopted. Numerous studies have estimated the demand for military expenditure in terms of economic, political and strategic variables (Dunne et al, 2001). My case study of the Netherlands as an individual country is less formal than the neoclassical approach.

Most of the independent variables expressed in levels contain a unit root and are I(1). Autoregressive terms are naturally added to the regression to correct for these time series properties (Swank et al, 1996). The number of autoregressive is based on the Q-statistics.[1]

The econometric model in my thesis represents an attempt to estimate the following equation:

MILITARY EXPENDITURE TO GDP RATIO = C + α LOG GDP + β DEBT/GDP + ξ DEFICIT/GDP + δ GOVERNMENT EXPENDITURES/GDP + φ TRADE/GDP + γ LOG POPULATION + η OCW/GDP + ς SZW/GDP + λ SEATS LEFT WING PARTIES + μ LIFE EXPECTANCY + π EXTERNAL WAR + θ LOG US MILITARY EXPENDITURES + ρ LOG SU MILITARY EXPENDITURES + ω MILITARY EXPENDITURE TO GDP RATIO (-1) + ε

The last section contains a summary table of the coefficients and significance levels of all variables. Conclusions regarding significance are based on the 90%, 95% and 99% confidence interval. The correlation matrix is included in the appendix and the excel file with the constructed variables is available upon request from the author.

---

[1] See figure 2 Appendix

Regression results

The following table provides descriptive statistics for the key variables of interest. In the next sections the econometric results are interpreted and linked with theory.

<u>The determinants of the Dutch demand for military spending</u>

Dependent Variable: MILITARY EXPENDITURE RATIO
Method: Least Squares
Sample: 1964 2013
Included observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.761945	0.509760	1.494713	0.1440
LOG GDP	-0.014576	0.006296	-2.315110	0.0266
DEBT / GDP	-0.002174	0.003525	-0.616609	0.5415
DEFICIT / GDP	0.006472	0.012183	0.531190	0.5986
GOV SPEN / GDP	0.012255	0.006262	1.957234	0.0583
TRADE / GDP	-0.005461	0.002637	-2.070845	0.0458
LOG POPULATION	-0.044243	0.035983	-1.229562	0.2271
OCW / GDP	0.007314	0.086176	0.084869	0.9328
SZW / GDP	0.059701	0.024698	2.417232	0.0210
SEATS LEFT WING	-0.002031	0.001011	-2.009565	0.0522
LIFE EXPECTANCY	0.002021	0.000716	2.820679	0.0078
EXTERNAL WAR	0.000617	0.000759	0.813159	0.4216
LOG MIL EXP US	-0.002087	0.001741	-1.198238	0.2389
LOG MIL EXP SU	0.000547	0.000383	1.429831	0.1616
AR TERM	0.181776	0.139084	1.306950	0.1998

R-squared	0.989909	Mean dependent var	0.024382
Adjusted R-squared	0.985873	S.D. dependent var	0.008722
S.E. of regression	0.001037	Akaike info criterion	-10.66235
Sum squared resid	3.76E-05	Schwarz criterion	-10.08874
Log likelihood	281.5588	Hannan-Quinn criter.	-10.44392
F-statistic	245.2490	Durbin-Watson stat	1.709423
Prob(F-statistic)	0.000000		

Economic constraints

During the last recession the Dutch department of defense faced enormous budgetary cuts. Ideally, foreign policy objectives are established first and then a military strategy and force structure is designed to meet those objectives. The cost of this force structure determines the defense budget, at which point the economic variables and budget priorities enter the picture (Olvey et al, 1984). However, in reality this ideal sequence is often completely reversed: economic constraints and budgetary ceilings dictate the acceptable force structure options (Looney et al, 1990).

The findings for the Netherlands do implicate that they live a second best world. Although the coefficient of GDP is significant at the 95% confidence interval, the negative sign is not in line with existing literature since military power reflects in some measure economic power (US Commission on Integrated Long-Term Strategy, 1988).

Government deficit is a flow quantity and is essentially different from national debt which is a stock quantity. This distinguished character of government deficit could have its own affect on military expenditures. The influence of national debt is insignificant but the negative sign indicates an economic constraint. On the other hand, a budgetary ceiling is not suggested by the (insignificant) positive sign of government deficit since it is unlikely that defense spending would increase with this variable. Furthermore, this positive relationship is conflicting with the share of total government spending in GDP.

This variable is used to account for the fact that the military will likely benefit from government expenditure per se (McKinlay, 1989). This claim is valid in my model because the total government spending in GDP is significant at the 90% confidence interval. The Dutch defense budget is therefore at least partially economically driven since government expenditures are financed by taxes which depend on the state of the economy. The department of defense does suffer from tighter economic constraints in times of crisis. This relationship will be further explored in the social welfare state chapter.

Trade as economic characteristic of military expenditures is included in my model as well. The hypothesis is that countries that are highly integrated in the global economy would find it easier to access finance for arms purchases, leading to higher military expenditures (Dunne et al, 2003). Moreover, a positive effect is expected because commercial interests need sometimes military protection as is the case in Somalia (Department of Defense, 2014). The established effect in my model is significant at the 95% confidence level but the negative sign is not in line with the existing literature (Albalate et al, 2012).

Population

In terms of absolute military expenditures the Netherlands rank among the top twenty of countries in the world. However, relatively they belong to the lowest forty states globally (SIPRI, 2014). In this light the impact of population on military expenditures is questioned since military expenditures per capita continuously declined after the end of World War II.

Population is included to pick up possible public good effects. Theory would suggest that a high population makes military spending more effective, as the total military expenditures benefits a larger number of people (Dunne et al, 2001). Due to scarce economic resources there is an optimal amount of money per capita to be spent on defense.

However, previous studies have established a negative relationship and their explanation is that a large population is considered to offer some autonomous security in itself. Invading a country with many residents is harder than invading a country with less, all else held constant. Small countries have to spend more on high tech weaponry as they cannot rely on a large army. Another reason would be that a higher population generates greater additional demand for civil consumption than it does for security requirements (Dunne et al, 2003).

In my analysis the effect of population is negative but not significant. Membership of NATO embodies size effects as well since an attack against one ally is considered an attack against all allies (NATO, 1949). However, public good effects of NATO membership are probably intervening in the optimal allocation of scarce economic resources on defense. This complicates the interpretation of the population variable.

Social welfare state

The scope of government expenditures related to building up the welfare state contains the annual budget relative to GDP of the department of Education, Culture & Science (OCW) and the annual budget relative to GDP of the department of Social Affairs & Employment (SZ&W). With respect to economic theory the distinction of these expenditures is interesting. The sign of the coefficients of these variables disclose whether these expenditures can be characterized as a complementary or substitute good.

The coefficient of SZ&W is significant at the 95% confidence level and the positive signs of both variables indicate a complementary good. Education, culture, science, social affairs and employment are politically equivalently prioritized. The budgets of these departments reveal common "cyclical spending properties" with the defense budget. If military expenditures decrease, the department of OCW and the department of SZ&W will decrease as well.

This finding is in accordance with claims about powerful lobbies acting in the political arena of The Hague. Culture and defense particularly lack such influential movements in contrast to health care costs. Data of health care costs is only available since 1972 and inclusion will be a disproportional concession to the sample period. Because cash flows for the department of defense are fixed, politicians easily "grab" in the defense budget to comply with the powerful lobby for health care expenditures. Since the start of cabinet Rutte I health care expenditures increased with two times the annual defense budget (Hillen, 2014).

Life expectancy is included as a proxy for the demand for health care and the related spending. Although health care costs are regarded as a substitute good, this variable is slightly positive and significant at the 99% confidence interval. There are no statistical indicators in my econometric framework that health expenditures are at the expense of military spending.

As stated in the economic constraints chapter, the relationship between government expenditures and military spending will be further explored. Since military expenditures are part of government spending, the positive correlation between the two variables seems naturally. For almost thirty years the health care costs ratio to GDP was between 10% and 12%. After 2001 this bandwidth no longer applies and the percentage of health care costs increased to almost 16% of GDP.

In order to test whether the positive correlation between government expenditures and military spending is valid through the sample period an additional variable is included in my model: government spending interacted with a dummy that takes on value one after 2001. This additional variable has no explanatory power since this variable is not significant.[2]

The sign of this interacted variable should have been negative if the defense budget was a casualty of financing the increased health care costs due to the aging society and higher health care costs in all stages of life (CPB, 2011). Policy makers are as a result forced to make hard choices but the claim that military expenditures are the victim of building up the social welfare state is not supported.
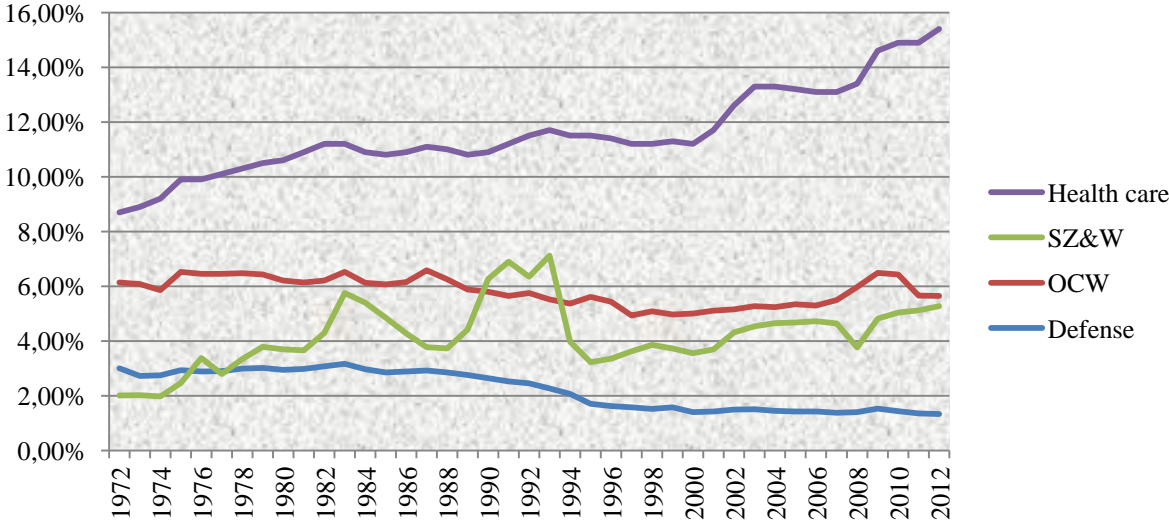
- **Figure 3: Dutch government expenditures relative to GDP (Source: CBS)**

---

[2] See figure 3 Appendix

Color of the government

It is widely found in the panel data analyses that democratic countries spend less on the military than non-democracies. Autocratic states are more likely to rely on the military to retain their grip on power and unjustifiable and inefficient levels of military expenditures are maintained in pursuance of the interests of an elite rather than the country as a whole (Maizels et al, 1986).

During the sample period there is no variation in the political system of the Netherlands but coalitions change at least every four year. The influence of left wing parties is tested on military expenditures because of the association with conscientious objectors and pacifist movements like War Resisters International. There is no support for an electoral defense spending cycle in the US post war era implicating military expenditures is probably not used on a systematic basis by the president or congress as a differentiated macroeconomic policy instrument for the purpose of winning elections (Zuk et al, 1986).

Two different variables measuring the influence of left wing parties are proposed. The first variable is a number related to the color of the government. The average score of the coalition parties reflects the position on the political spectrum (left wing -1, center 0 and right wing +1). However, the average score does not reflect representation of each party within the coalition. The second criterion is for this reason more sophisticated: the number of seats of left wing parties in the coalition divided by the total amount of seats of the coalition.[3]

Statistical theory prescribes that if a relationship shows itself strongly it should be even more apparent using a finer classification (De Long et al, 1993). This variable will be preferred in my analysis. The effect of the color of the government on military expenditures is negative and significant at the 90% confidence interval.

The negative effect of left wing parties on military expenditures could be translated into a Niskanen type bureau supply model where decision makers act to maximize budget size. What they consider the optimal level of defense capability reflects circumstances in time (Niskanen, 1971). The mutable political power of left wing parties is one of these determinants. Perception of internal and external threats and defining economic constraints are both linked to the political parties in power.

---

[3] See table 1 Appendix

Arms race between East and West

"We make war so that we may live in peace", Aristotle (384 – 322 B.C.). One would therefore expect the demand for military spending to be influenced by the strategic environment and foreign policy objectives. The importance of strategic variables like security and threat perceptions are investigated, just as the authority of the US as leader of the free world.

The EU was awarded the Nobel Peace Prize in 2012 because of its contribution for over six decades to the advancement of peace and reconciliation, democracy and human rights in Europe. This act induced great controversy since the Nobel Committee did not distinguish between external and internal conflicts. In the academic literature is noted that the end of the Cold War effectively terminated superpower proxy wars in the developing world (Batchelor et al, 1998).

Civil war is since then far more common than international conflict. The outbreak of internal conflicts is determined by opportunities and objective grievances (Collier et al, 2004). Three sources for financing rebellion are considered: extortion of natural resources, donations from diasporas and subventions from hostile governments. Another dimension of opportunity is weak government capability. There are four objective measures of grievance: ethnic or religious hatred, political repression, political exclusion and economic inequality. In the Netherlands opportunities and grievances are absent (SIPRI, 2014). Because no internal threats are faced this aspect is excluded from the analysis.

With respect to external threats the Security Web is an important concept. This defines neighbors and other countries that can affect a nation's security. Rosh (1988) uses the average military burden of the Security Web. Nevertheless, in case of two unequal rivals the absolute level of military expenditures is a better measure. India for example spends about twice as much on defense as Pakistan in absolute terms but the mirror image occurs for Pakistan in relative terms. To counter the higher absolute level of threat, Pakistan devotes a higher proportion of its resources (Dunne et al, 2001). This applies to my thesis since the comparison between Russia and the Netherland is unequal as well.

In the conceptual framework of the Security Web three nested variables are constructed. The military expenditures of neighbors are extended to regional powers and finally super powers are included. Since Belgium, France, Germany and the United Kingdom are NATO members only Russia as super power is relevant.

The Soviets undertook in the beginning of the early sixties a rapid expansion of military capabilities. This situation continued through the seventies, so that by the end of that decade the gravity of the military threat posed by the Soviet Union began to impress the American people and their leaders (Looney et al, 1990). The arms race with the US could not be sustained due to poor economic development. As noted before, military power reflects in some measure economic power.

The counterpart of NATO was the Warschaupact with the Soviet Union as most important member. The unremitting arms race between East and West seems strikingly not to affect Dutch military expenditures since Russian military expenditures are insignificant. This is an indication for free riding behavior of the Netherlands with the NATO alliance.

The end of the Cold War has been a clear change in the strategic environment (Dunne et al, 2003). The fall of the Berlin Wall symbolized the failure of the Soviet Union because the Marxism-Leninism ideology has not prevailed (Bowker, 1997). The presence of a structural break is tested with a dummy that takes the value of zero before 1989 and one afterwards. The collapse of the Soviet Union did not mark a structural break in my analysis.[4]
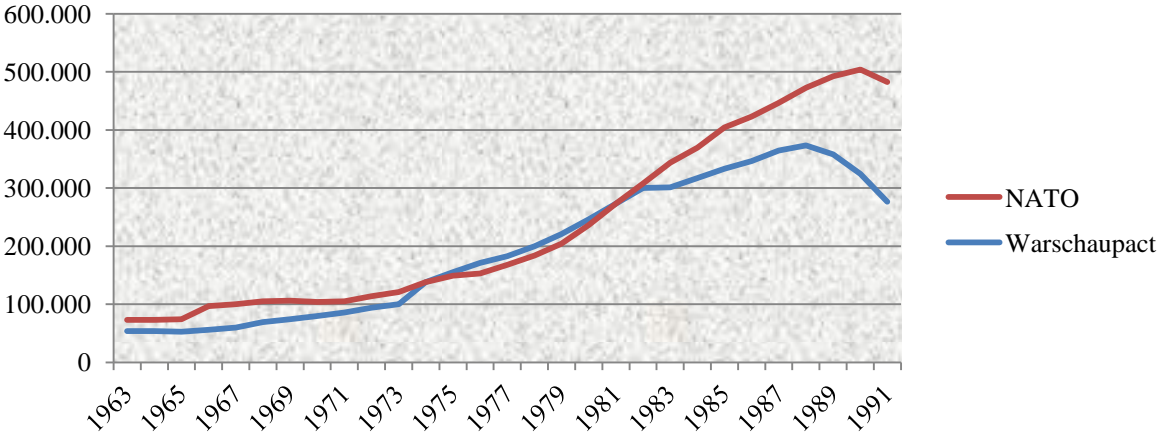
- **Figure 4: The arms race between East and West in $ millions (Source: The Office of the Under Secretary of Defense for Policy).**

---

[4] See figure 4 Appendix

NATO commitment

The conflict with Indonesia about the territory of New Guinea in 1962 is bilateral but most foreign missions with respect to the external war dummy are multilateral. Sacrifices in the Korean War, Operation Desert Storm, the Kosovo War and the War on Terror are all performed under NATO or UN command. Safety motivations seem to play a minor role in the determination of the Dutch military expenditures because the external war is not significant.

These missions point directly to the importance of the North Atlantic Treaty Organization (NATO). The organization constitutes a system of collective defense whereby its member states agree to mutual defense in response to an attack by any external party, initially communist countries in Eastern Europe. The Dutch government confirmed in the cabinet meeting in 1951 the rapidly deteriorating relation between East and West. However, due to American NATO membership a direct attack by the Soviet Union seemed unlikely to the Dutch government. According to former Prime Minister Drees the political importance outweighed the military effectiveness of the alliance, which was in his view insufficiently equipped. The preservation of freedom was served best by economic and social policy. Military expenditures only negatively affected economic and social conditions (Brouwer et al, 1992).

This raises the question whether the Netherlands have been free riding with the US department of defense, a claim recently made by the leader of the Dutch liberal party VVD, who stated that "the Americans paid for our security, while we were building up our welfare state".

Either by formal treaty, presidential declaration or executive agreement the US is committed to provide military support to several nations throughout the world. Probably no other barometer of US capabilities in fulfilling those commitments is so closely watched as the level of its spending on defense (Looney et al, 1990). Unquestionably, the US has been the most formidable military power the last decades. Hence, US military expenditures are included in my analysis. Although the coefficient is negative, the claim of the VVD leader is not supported since the US military expenditures variable is not significant.

A possible explanation is that the interests of the Netherlands are only perfectly aligned with the interests of the US in the intergovernmental military alliance NATO. By foundation the member states agreed to spend two percent of their GDP on defense but most nations except the US fail to fulfill this quota (Schramade, 2013).

Besides this commitment countries contribute to the military budget, the civil budget and the security investment program (NSIP). NATO operations are directly funded by these three common accounts. However, financial reporting of NATO is inscrutable (International Board of Auditors for NATO, 2013). The military budget is largest of the three accounts and individual member states contributions are based on a cost sharing formula, which remain unchanged for a certain period of time (Ek, 2012).

The undisputed leader of the alliance is the US and much of the costs are born by this power. The US share of the NATO burden is a notable complaint and concerns about the future of the transatlantic defense cooperation have become more pronounced (O'Donnell, 2012). In the NATO alliance the pure public good attribute of national defense and differences in member size combine to create free riding behavior by smaller alliance members. This result holds even when the level of GDP per capita is held constant and when is corrected for more influence on alliance policy in return of a greater share of alliance costs. Only in times of all out war or exceptional insecurity when defense is an absolutely superior good, disproportional burden sharing will decrease (Olson et al, 1966).

The cost sharing formula of the common NATO accounts is renegotiated from time to time. However, the US is deprived of their strongest bargaining weapon: not helping to defend the smaller powers became after the treaty ratification an incredible threat. The tendency toward sub optimality and disproportionally is stronger the more complete the unity of purpose among the allies; divergence of interests within the organization will increase the private (national) benefits from the national contributions to the alliance (Olson et al, 1966).

Political and moral statements by president Obama that every NATO member has to do its fair share will not provoke any change (Hallams et al, 2012). Only institutional reforms to the Pareto optimal point of disagreement can alleviate the sub optimality since there is obviously a point beyond which differences of purpose will destroy an alliance. This remains a challenge for the future (Santen et al, 2008).

Robustness

The multivariate OLS regression has tried to unravel the determinants of the Dutch military expenditure ratio. However, most academic articles in the scope of defense economics have published about the effect of explanatory variables on the level of military expenditures. These papers have converted the (real) military expenditures into logarithms but have not addressed the issue of stationarity.

The data of the Dutch defense spending as well as the independent variables expressed in levels contain a unit root and are I(1). Autoregressive terms are naturally added to the regression to correct for these time series properties. A sensitivity check is performed with LOG MILITARY EXPENDITURES as alternative dependent variable to verify the robustness of my results.

Sensitivity check of the determinants of the Dutch demand for military spending

Dependent Variable: LOG MILITARY EXPENDITURES
Method: Least Squares
Sample: 1964 2013
Included observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	34.60775	18.61760	1.858873	0.0715
LOG GDP	0.814041	0.229944	3.540173	0.0012
DEBT / GDP	0.103443	0.128757	0.803397	0.4272
DEFICIT / GDP	0.182407	0.444959	0.409941	0.6843
GOV SPEN / GDP	0.752312	0.228689	3.289670	0.0023
TRADE / GDP	-0.424496	0.096304	-4.407870	0.0001
LOG POPULATION	-2.416914	1.314182	-1.839101	0.0744
OCW / GDP	0.236007	3.147355	0.074986	0.9407
SZW / GDP	3.412758	0.902031	3.783413	0.0006
SEATS LEFT WING	-0.050724	0.036916	-1.374058	0.1782
LIFE EXPECTANCY	0.047119	0.026164	1.800909	0.0803
EXTERNAL WAR	-0.007772	0.027708	-0.280488	0.7808
LOG MIL EXP US	-0.087118	0.063601	-1.369752	0.1795
LOG MIL EXP SU	0.045800	0.013977	3.276714	0.0024
AR TERM	5.579336	5.079679	1.098364	0.2795

R-squared	0.945479	Mean dependent var	6.931253
Adjusted R-squared	0.923670	S.D. dependent var	0.137037
S.E. of regression	0.037860	Akaike info criterion	-3.466505
Sum squared resid	0.050169	Schwarz criterion	-2.892898
Log likelihood	101.6626	Hannan-Quinn criter.	-3.248073
F-statistic	43.35382	Durbin-Watson stat	2.069049
Prob(F-statistic)	0.000000		

The modification of GDP as explanatory variable is straightforward since the dependent variable military expenditure ratio already corrected for national income. The positive and significant effect of GDP in this model implicates that military power reflects in some measure economic power (US Commission on Integrated Long-Term Strategy, 1988).

Although all coefficients of the independent variables are (slightly) altered, the results of deficit, government spending, trade, OCW, SZW, life expectancy and US military expenditures are quite robust. The variables debt and external war establish a negative instead of a positive relationship but they remain insignificant. The impact of population is strengthened and becomes significant. The interpretation in terms of significance of the explanatory variables seats of left wing parties and SU military expenditures has changed as well.

The analysis about the determinants of military expenditures is never performed for industrialized countries that are member of stable alliance systems. My thesis has tried to clarify the different dynamics because of possible free riding behavior. Ideally, this is the start of further research.

Summary

Economic, political and strategic variables are considered in an OLS regression to unravel the determinants of the Dutch demand for military spending. Economic constraints and budgetary ceilings do not directly dictate these annual expenditures but there is some evidence that the department of defense does suffer from tighter economic constraints in times of crisis.

Once developing and developed countries were separated in the analysis of Knight et al it turned out there is indeed a significant peace dividend. The military spending ratio of the Netherlands is globally among the lowest forty and can be regarded as the minimum level once peace is secured.

The peace dividend was maximized because of the low incidence of major armed conflicts. Safety motivations seem not to affect military expenditures. The collapse of the Soviet Union did not mark a structural break and this is an indication for free riding behavior of the Netherlands with the NATO alliance.

Foreign policy objectives of the Netherlands are perfectly aligned with the interests of the US in NATO. The pure public good attribute of national defense and differences in member size combine to create free riding behavior and the tendency toward sub optimality and disproportionally is stronger the more complete the unity of purpose among the allies. Former Prime Minister anticipated the political importance of US membership already by foundation of the intergovernmental military alliance.

As a result, the Netherlands shifted the political focus after World War II from high to low politics. The welfare state is a social democratic concept and left wing parties in the coalition have a negative effect on military expenditures. Political parties in power define the strategic environment and indirectly determine economic constraints.

Due to the Krim crisis and the brutal Jihad by IS defense regained emphasis in the political arena and as a reaction the Netherlands agreed to increase their military expenditures. Or to conclude with the words of Machiavelli, the ruler should never divert his thought from defense; in times of peace he must become even more proficient.

Summary statistics: the coefficients and the significance levels of all variables

	MIL EXP RATIO (BASIC MODEL)	MIL EXP RATIO (FIG II APP.)	MIL EXP RATIO (FIG III APP.)	LOG MIL EXP (ROBUSTNESS)
C	0.761945 (0.509760)	0.938602 (0.562598)	0.755421 (0.505510)	34.60775 (18.61760)*
LOG GDP	-0.014576 (0.006296)**	-0.012200 (0.007057)*	-0.015884 (0.006329)**	0.814041 (0.229944)***
DEBT / GDP	-0.002174 (0.003525)	6.62E-06 (0.004553)	-0.003676 (0.003693)	0.103443 (0.128757)
DEFICIT / GDP	0.006472 (0.012183)	0.007985 (0.012416)	0.008778 (0.012218)	0.182407 (0.444959)
GOV SPEN / GDP	0.012255 (0.006262)*	0.013787 (0.006611)**	0.017349 (0.007404)**	0.752312 (0.228689)***
GOV SPEN / GDP * HEALTH		0.003132 (0.004102)		
TRADE / GDP	-0.005461 (0.002637)**	-0.005702 (0.002671)**	-0.004725 (0.002679)*	-0.424496 (0.096304)***
LOG POPULATION	-0.044243 (0.035983)	-0.055834 (0.039253)	-0.042393 (0.035711)	-2.416914 (1.314182)*
OCW / GDP	0.007314 (0.086176)	-0.003465 (0.087836)	0.023238 (0.086379)	0.236007 (3.147355)
SZW / GDP	0.059701 (0.024698)**	0.063954 (0.025463)**	0.054444 (0.024842)**	3.412758 (0.902031)***
SEATS LEFT WING	-0.002031 (0.001011)*	-0.002095 (0.001020)**	-0.002616 (0.001104)**	-0.050724 (0.036916)
LIFE EXPECTANCY	0.002021 (0.000716)***	0.002017 (0.000721)***	0.001872 (0.000720)**	0.047119 (0.026164)*
EXTERNAL WAR	0.000617 (0.000759)	0.000211 (0.000930)	0.000356 (0.000780)	-0.007772 (0.027708)
LOG MIL EXP US	-0.002087 (0.001741)	-0.003168 (0.002253)	-0.002252 (0.001732)	-0.087118 (0.063601)
LOG MIL EXP SU	0.000547 (0.000383)	0.000575 (0.000387)	0.000697 (0.000398)*	0.045800 (0.013977)***
COLD WAR			0.001553 (0.001230)	
AR TERM	0.181776 (0.139084)	0.167127 (0.141230)	0.152555 (0.139846)	5.579336 (5.079679)

Note: standard errors in parentheses; * significant at 10%, ** significant at 5%, *** significant at 1%.

Bibliography

- Albalate, D., Bel, G., Elias, F. 2012. Institutional determinants of military spending. *Journal of Comparative Economics.* Vol. 40, Issue 2.

- Batchelor, P., Dunne, P., Lamb, G. 1998. *The demand for military spending in South Africa.* London: Middlesex University.

- Baumgartner, F., Jones, B. 2002. *Policy dynamics.* Chicago: The University of Chicago Press.

- Bowker, M. 1997. *Russian foreign policy and the end of the Cold War.* London: Dartmouth Publishing Company.

- Brouwer, J., Megens, C. 1992. Het debat in de ministerraad over de Nederlandse militaire bijdrage aan de NAVO, 1949-1951. *BMGN – Low Countries Historical Review.* Vol. 107, No. 3.

- Centraal Planbureau, 2011. Zorg blijft groeien, financiering onder druk. *CPB Policy Brief 2011/11.*

- Collier, P., Hoeffler, A. 2004. Greed and grievance in civil war. *Oxford Economic Papers.* Vol. 56 (2004).

- De Long, J., Schleifer, A. 1993. Princes and merchants: European city growth before the Industrial Revolution. *Journal of Law and Economics.* Vol. XXXVI (October 1993).

- Deger, S., Sen, S. 1990. Military security and the economy: defense expenditure in India and Pakistan. *The Economics of Defense Spending.*

- Dunne, P., Perlo-Freeman, S. 2001. *The demand for military spending in developing countries.* London: Middlesex University.

- Dunne, P., Perlo-Freeman, S. 2003. The demand for military spending in developing countries: a dynamic panel analysis. *Defense and Peace economics.* Vol. 14(6) (December 2003).

- Ek, C. 2012. NATO common funds burdensharing: background and current issues. *Congressional Research Service.* February 15, 2012.

- Hallams, E., Schreer, B. 2012. Towards a "post-American" alliance? NATO burden-sharing after Libya. *International Affairs.* Vol. 88, No. 2 (2012).

- Hewitt, D. 1993. Military expenditures 1972-1990: The reasons behind the post-1985 fall in world military spending. *IMF Working Paper WP/93/18* (March 1993).

- Hillen, H. 2014. *TROS Kamerbreed.*

http://www.ftm.nl/exclusive/defensiebudget-nederland-gedraagt-zich-free-rider/

http://www.radio1.nl/popup/terugluisteren-uren/2014-08-23/13:00

- International Board of Auditors for NATO (IBAN). 2013. *Controle van NAVO-uitgaven.*

- Knight, M., Loayza, N., Villanueva, D. 1996. The peace dividend: Military spending cuts and economic growth. *Policy Research Working Paper 1577* (February 1996).

- Looney R., Mehay, S. 1990. *United States defense expenditures: trends and analysis.* New York: Routledge.

- Maizels, A., Nissanke, M. 1986. The determinants of military expenditures in developing countries. *World Development.* Vol. 14, No. 9.

- McKinlay, R. 1989. *Third world military expenditure: determinants and implications.* London: Pinter

- Ministerie van Defensie, 2014. *Antipiraterij.* http://www.defensie.nl/onderwerpen/somalie/inhoud/antipiraterij

- NATO, 1949. *The North Atlantic Treaty.* Washington D.C.: 4 April 1949.

- Niskanen, W. 1971. *Bureaucracy and Representative Government.* Chicago: Aldine.

- O'Donnell, C. 2012. *The implications of military spending cuts for NATO's largest members.* Washington D.C.: The Brookings Institution.

- Olson, M., Zeckhauser, R. 1966. An economic theory of alliances. *The Review of Economics and Statistics.* Vol. 48, No. 3 (August 1966).

- Olvey, L., Golden, J., Kelly, R. 1984. *The economics of national security.* New York: Avery.

- Patomäki, H. 2008. *The political economy of global security: war, future crises and changes in global governance.* New York: Routledge.

- Richardson, L. 1960. *Arms and insecurity: a mathematical study of causes and origins of war.* Pittsburgh: Boxwood Press.

- Ripsman, N. 2000. The political economy of security: a research and teaching agenda. *Journal of Military and Strategic Studies.* Vol. 1, No. 2 (Spring 2000).

- Rutte, M. 2014. *Afspraken gemaakt over verhoging reactiesnelheid NAVO.* Den Haag: Rijksoverheid.

- Santen, H., Molenaar, A. 2008. EU-NAVO-samenwerking: tijd voor transformatie. *Internationale Spectator.* Jaargang 62, nr. 6.

- Schramade, K. 2013. Defensiebudget: Nederland gedraagt zich als free rider. *Follow the Money.* 29/10/2013.

- SIPRI, 2014. Stockholm International Peace Research Institute: the independent resource on global security. *Monitoring military expenditures.* http://www.sipri.org/research/armaments/milex/measuring-military-expenditures

- Smith, R. 1980. The demand for military expenditure. *Economic Journal.* Vol. 90, No. 4.

- Sosnovy, T. 1964. The Soviet military budget. *Foreign Affairs.* April 1964 Issue.

- Swank, O., Van Dalen, H. 1996. Government spending cycles: ideological or opportunistic? *Public Choice.* Vol. 89, No. 1/2.

- Thompson, E. 1974. Taxation and national defense. *Journal of Political Economy.* Vol. 82.

- Uppsala Conflict Data Program (UCDP). 2013. *UCPD/PRIO Armed conflict dataset codebook.* Oslo: International Peace Research Institute (PRIO).

- US Commission on Integrated Long-Term Strategy. 1988. *Discriminate deterrence.* Washington D.C.: US Government Printing Office (USGPO).

- Wooldridge, M. 2009. *Introductory Econometrics: a modern approach.* Boston: South-Western Cengage Learning.

- Zuk, G., Woodbury, N. 1986. US defense spending, electoral cycles and Soviet-American relations. *Journal of Conflict Resolution.* Vol. 30, No. 3.

Appendix

Figure 1: Correlation matrix

	Y	GDP	DEBT	DEFICIT	GOV	TRADE	POP	OCW	SZ&W	SEATS	LIFE	WAR	US	SU
Y	1,00													
GDP	-0,96	1,00												
DEBT	0,21	-0,19	1,00											
DEFICIT	-0,15	0,07	-0,40	1,00										
GOV	0,40	-0,29	0,37	-0,72	1,00									
TRADE	-0,76	0,85	0,04	-0,08	-0,12	1,00								
POP	-0,95	0,98	-0,05	-0,03	-0,21	0,84	1,00							
OCW	0,20	-0,15	-0,05	-0,58	0,67	-0,12	-0,12	1,00						
SZ&W	-0,56	0,63	0,28	-0,42	0,21	0,55	0,72	0,13	1,00					
SEATS	-0,37	0,26	-0,07	0,32	-0,33	0,15	0,27	-0,18	0,14	1,00				
LIFE	-0,88	0,95	0,04	-0,16	-0,06	0,88	0,98	-0,01	0,76	0,20	1,00			
WAR	-0,70	0,79	-0,25	0,16	-0,29	0,73	0,73	-0,23	0,42	0,14	0,70	1,00		
US	-0,44	0,58	0,18	-0,21	0,09	0,71	0,57	0,17	0,45	-0,18	0,64	0,63	1,00	
SU	0,72	-0,69	0,03	-0,44	0,62	-0,57	-0,67	0,66	-0,26	-0,41	-0,57	-0,62	-0,31	1,00

Figure 2: Correlogram of residuals (Q-statistics)

Sample: 1964 2013
Included observations: 50

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |** |	. |** |	1	0.230	0.230	2.8701	0.090
.*| . |	**| . |	2	-0.150	-0.215	4.1184	0.128
.*| . |	. | . |	3	-0.081	0.012	4.4862	0.214
. | . |	. | . |	4	-0.001	-0.015	4.4863	0.344
**| . |	**| . |	5	-0.224	-0.261	7.4272	0.191
**| . |	.*| . |	6	-0.225	-0.115	10.466	0.106
. | . |	. | . |	7	0.017	0.025	10.484	0.163
. | . |	.*| . |	8	0.037	-0.080	10.571	0.227
**| . |	**| . |	9	-0.215	-0.259	13.550	0.139
.*| . |	.*| . |	10	-0.174	-0.145	15.556	0.113
. |*. |	. | . |	11	0.108	0.010	16.341	0.129
. | . |	.*| . |	12	0.072	-0.110	16.705	0.161
. |*. |	. |*. |	13	0.120	0.139	17.729	0.168
. |*. |	.*| . |	14	0.089	-0.081	18.308	0.193
. | . |	.*| . |	15	0.003	-0.165	18.309	0.247
. | . |	. | . |	16	-0.002	0.047	18.309	0.306
.*| . |	.*| . |	17	-0.066	-0.100	18.653	0.349
. |*. |	. |** |	18	0.199	0.296	21.905	0.236
. | . |	.*| . |	19	0.050	-0.128	22.120	0.278
.*| . |	.*| . |	20	-0.162	-0.158	24.416	0.225
.*| . |	. | . |	21	-0.111	0.003	25.518	0.225
. | . |	. | . |	22	-0.021	-0.058	25.559	0.271
.*| . |	.*| . |	23	-0.165	-0.069	28.190	0.209
.*| . |	. | . |	24	-0.076	-0.011	28.775	0.229

Figure 3: Correlation military expenditures and government spending

Dependent Variable: MILITARY EXPENDITURE RATIO
Method: Least Squares
Sample: 1964 2013
Included observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.938602	0.562598	1.668334	0.1044
LOG GDP	-0.012200	0.007057	-1.728752	0.0929
DEBT / GDP	6.62E-06	0.004553	0.001455	0.9988
DEFICIT / GDP	0.007985	0.012416	0.643116	0.5245
GOV SPEN / GDP	0.013787	0.006611	2.085486	0.0446
GOV SPEN / GDP * HEALTH	0.003132	0.004102	0.763551	0.4504
TRADE / GDP	-0.005702	0.002671	-2.134372	0.0401
LOG POPULATION	-0.055834	0.039253	-1.422400	0.1640
OCW / GDP	-0.003465	0.087836	-0.039447	0.9688
SZW / GDP	0.063954	0.025463	2.511622	0.0169
SEATS LEFT WING	-0.002095	0.001020	-2.053260	0.0478
LIFE EXPECTANCY	0.002017	0.000721	2.798540	0.0084
EXTERNAL WAR	0.000211	0.000930	0.226622	0.8221
LOG MIL EXP US	-0.003168	0.002253	-1.406268	0.1687
LOG MIL EXP SU	0.000575	0.000387	1.487579	0.1461
AR TERM	0.167127	0.141230	1.183375	0.2449

R-squared	0.990079	Mean dependent var		0.024382
Adjusted R-squared	0.985702	S.D. dependent var		0.008722
S.E. of regression	0.001043	Akaike info criterion		-10.63935
Sum squared resid	3.70E-05	Schwarz criterion		-10.02751
Log likelihood	281.9838	Hannan-Quinn criter.		-10.40636
F-statistic	226.2109	Durbin-Watson stat		1.743891
Prob(F-statistic)	0.000000			

Figure 4: Presence of structural break

Dependent Variable: MILITARY EXPENDITURE RATIO
Method: Least Squares
Sample: 1964 2013
Included observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.755421	0.505510	1.494373	0.1443
LOG GDP	-0.015884	0.006329	-2.509912	0.0170
DEBT / GDP	-0.003676	0.003693	-0.995393	0.3266
DEFICIT / GDP	0.008778	0.012218	0.718438	0.4774
GOV SPEN / GDP	0.017349	0.007404	2.343118	0.0251
TRADE / GDP	-0.004725	0.002679	-1.763881	0.0867
LOG POPULATION	-0.042393	0.035711	-1.187091	0.2434
OCW / GDP	0.023238	0.086379	0.269022	0.7895
SZW / GDP	0.054444	0.024842	2.191595	0.0354
SEATS LEFT WING	-0.002616	0.001104	-2.369251	0.0236
LIFE EXPECTANCY	0.001872	0.000720	2.598920	0.0137
EXTERNAL WAR	0.000356	0.000780	0.455703	0.6515
LOG MIL EXP US	-0.002252	0.001732	-1.300298	0.2022
LOG MIL EXP SU	0.000697	0.000398	1.753248	0.0886
COLD WAR	0.001553	0.001230	1.262783	0.2153
AR TERM	0.152555	0.139846	1.090883	0.2830

R-squared	0.990361	Mean dependent var	0.024382
Adjusted R-squared	0.986109	S.D. dependent var	0.008722
S.E. of regression	0.001028	Akaike info criterion	-10.66818
Sum squared resid	3.59E-05	Schwarz criterion	-10.05634
Log likelihood	282.7046	Hannan-Quinn criter.	-10.43519
F-statistic	232.8942	Durbin-Watson stat	1.636194
Prob(F-statistic)	0.000000		

Table 1: Color of the government

Period	Cabinet	Left wing	Center parties	Right wing	Score	Seats
1946-48	Beel I	PvdA	KVP	-	-0,50	0,48
1948-51	Drees-Van Schaik	PvdA	CHU, KVP	VVD	0,00	0,36
1951-52	Drees I	PvdA	CHU, KVP	VVD	0,00	0,36
1952-56	Drees II	PvdA	ARP, CHU, KVP	-	-0,25	0,37
1956-58	Drees III	PvdA	ARP, CHU, KVP	-	-0,25	0,39
1958-59	Beel II	-	ARP, CHU, KVP	-	0,00	0,00
1959-63	De Quay	-	ARP, CHU, KVP	VVD	0,25	0,00
1963-65	Marijnen	-	ARP, CHU, KVP	VVD	0,25	0,00
1965-66	Cals	PvdA	ARP, KVP	-	-0,33	0,41
1966-67	Zijlstra	-	ARP, KVP	-	0,00	0,00
1967-71	De Jong	-	ARP, CHU, KVP	VVD	0,25	0,00
1971-72	Biesheuvel I	DS'70	ARP, CHU, KVP	VVD	0,00	0,10
1972-73	Biesheuvel II	-	ARP, CHU, KVP	VVD	0,25	0,00
1973-77	Den Uyl	PvdA, PPR	ARP, KVP, D66	-	-0,20	0,52
1977-81	Van Agt I	-	CDA	VVD	0,50	0,00
1981-82	Van Agt II	PvdA	CDA, D66	-	-0,33	0,40
1982-82	Van Agt III	-	CDA, D66	-	0,00	0,00
1982-86	Lubbers I	-	CDA	VVD	0,50	0,00
1986-89	Lubbers II	-	CDA	VVD	0,50	0,00
1989-94	Lubbers III	PvdA	CDA	-	-0,50	0,48
1994-98	Kok I	PvdA	D66	VVD	0,00	0,40
1998-02	Kok II	PvdA	D66	VVD	0,00	0,46
2002-03	Balkenende I	-	CDA	LPF, VVD	0,67	0,00
2003-06	Balkenende II	-	CDA, D66	VVD	0,33	0,00
2006-07	Balkenende III	-	CDA	VVD	0,50	0,00
2007-10	Balkenende IV	PvdA	CDA, CU	-	-0,33	0,41
2010-12	Rutte I	-	CDA	VVD	0,50	0,00
2012-	Rutte II	PvdA	-	VVD	0,00	0,47

Note: the parties ARP, CHU and KVP merged in 1977 into the general confessional party CDA.