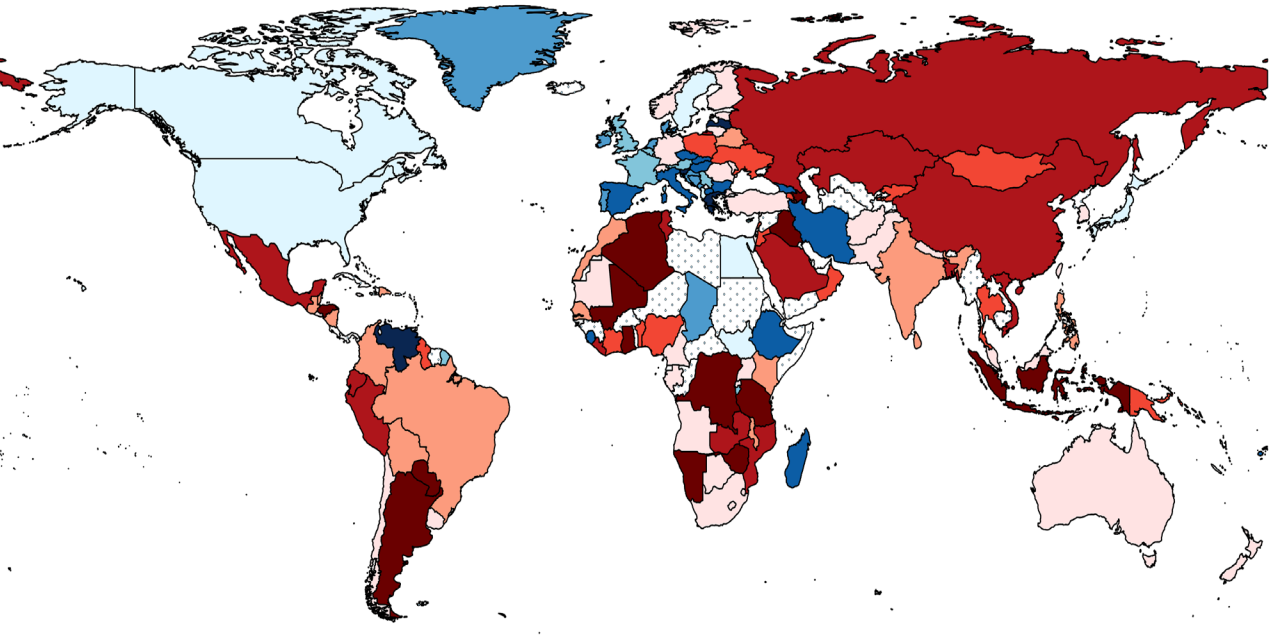


Defence Economic Outlook 2016

Global Outlook with a Focus on the Baltic Sea

Per Olsson and Peter Bäckström

FOI-R--4315--SE

November 2016

FOI

Per Olsson and Peter Bäckström

Defence Economic Outlook 2016

Global Outlook with a Focus on the Baltic Sea

Bild/Cover: FOI Peter Bäckström

Titel	Defence Economic Outlook 2016 – Global Outlook with a Focus on the Baltic Sea
Title	Försvarsekonomisk utblick 2016 – Global utblick med fokus på Östersjön
Rapportnr/Report no	FOI-R--4315--SE
Månad/Month	November
Utgivningsår/Year	2016
Antal sidor/Pages	56
ISSN	1650-1942
Kund/Customer	Försvarsdepartementet/Ministry of Defence
Forskningsområde	6. Metod- och utredningsstöd
FoT-område	Modellering och simulering
Projektnr/Project no	A16107
Godkänd av/Approved by	Lars Höstbeck
Ansvarig avdelning	Försvarsanalys

Sammanfattning

Denna rapport är den första i serien *Defence Economic Outlook* (DEO) som genomförs inom projektet Försvarsekonomiska studier med det svenska Försvarsdepartementet som mottagare. DEO-rapporterna återkommer vartannat år och innehåller en överblick av globala försvarsutgifter samt ett särskilt tema. Årets tema är drivkrafterna bakom försvarsutgifter i länderna runt Östersjön.

Globalt har västländerna minskat sina försvarsutgifter under det senaste årtiondet medan flera länder i andra regioner, särskilt tillväxtekonomierna, har ökat sina. USA är alltjämt världens främsta militärmakt med världens högsta militärutgifter, men länder som Kina och Ryssland har stadigt minskat gapet. Denna förändring är långt ifrån tillräcklig för att ändra den globala maktbalansen, men den har ändrat regional säkerhetsdynamik.

Med fokus på Östersjöregionen genomför vi en ekonometrisk analys med stöd i försvarsekonomisk teori. Vi undersöker huruvida den ryska militära upprustningen har påverkat regionens övriga länder. Våra resultat tyder på att en ökning av förändringstakten i ryska försvarsutgifter och ryska försvarsutgifter som andel av bruttonationalprodukten bidrar till att förklara ökningar av försvarsutgifter bland de övriga länderna runt Östersjön. Ekonomisk tillväxt och befolkningsförändring bidrar också till att förklara försvarsutgifternas utveckling i regionen. Resultaten tyder också på att de övriga Östersjöländer, förutom Ryssland, i viss mån förlitar sig på varandra för säkerhet. Medan vi tolkar resultatens orsakssamband med försiktighet så är de likväl statistiskt signifikanta och kan bidra till att fördjupa vår förståelse av militärutgifter i Östersjöregionen.

Nyckelord: *Militärutgifter, global säkerhet, Östersjön, försvarsekonomisk teori, ekonometrisk analys, militär prioritering*

Summary

This report is the first in a biennial series called *Defence Economic Outlook* (DEO) which is carried out through the project Defence Economic Studies at the request of the Swedish Ministry of Defence. Each DEO report will contain an overview of global military expenditure as well as a special topic. This year's topic is the driving forces behind military expenditure by the countries around the Baltic Sea.

Globally, Western countries have decreased their military spending over the past decade while several countries in other regions, especially emerging economies, have increased theirs. The US remains the world's foremost military power and largest military spender, but countries such as China and Russia have steadily been closing the gap. This change has not been nearly enough to shift the global power balance, but it has changed regional security dynamics.

Focusing on the Baltic Sea region, we conduct an econometric analysis, drawing on defence economic theory. We investigate whether the Russian military build-up has affected the other countries in the region. Our findings suggest that increases in the rate of change in Russian military spending and Russian military expenditure as a share of gross domestic product help to explain the increases in military expenditure by the other countries around the Baltic Sea. Economic growth and population change can also help to explain patterns of military spending in the region. The results also suggest that Baltic Sea countries other than Russia to a certain extent rely on each other for security. While interpreting the causality of these findings with caution, they are nonetheless statistically significant and can contribute to deepen our understanding of military spending in the Baltic Sea region.

Keywords: *Military spending, global security, Baltic Sea, defence economic theory, econometric analysis, military prioritisation*

Contents

1 Introduction

Military expenditure has increased around the globe over the past decade. However, this increase has been uneven. Several countries in Asia, the Middle East and sub-Saharan Africa have increased their defence budgets while traditionally large spenders such as the US and Western European countries have decreased their military spending. At the same time, regional conflicts continue. In addition to ongoing wars and acts of terrorism in the Middle East, there are also increasing tensions in South East Asia and Eastern Europe. For the first time since the end of the Cold War, Sweden finds itself in the middle of regional tensions around the Baltic Sea.

The rapid changes in global military expenditures highlight the importance of an up-to-date overview of global defence spending. They also necessitate an understanding of the dynamics that drive military expenditure.

This report is the first in a biennial series, *Defence Economic Outlook* (DEO), initiated at the request of the Swedish Ministry of Defence. It is carried out through the project Defence Economic Studies. Each DEO will contain an overview of global military expenditure and of security issues. In this regard, the reports will continue the work of Bengt-Göran Bergstrand,[1] Peter Nordlund and Janne Åkerström.[2] They also draw inspiration from a recent study by the Norwegian Defence Research Establishment (FFI), by Ida Helene Berg and Sverre Nyhus Kvalvik.[3] In addition, each issue of DEO will examine a specific topic or have a particular area of focus.

This year's focus is on helping to explain changes in patterns of military expenditure in the Baltic Sea region.[4] We will do this by using an econometric model derived from defence economic theory. By doing so we hope to help identify the regional driving forces behind military expenditure. To our knowledge this is the first time in Sweden that an attempt has been made to explain regional military expenditure using an econometric model.

---

[1] E.g. Bergstrand, Bengt-Göran (2015a). *NATO Military Expenditures: Trends 2010–2015 with Projections for 2016-2020*. FOI-R--4223--SE, December; and Bergstrand, Bengt-Göran (2015b). *Military Expenditure Trends in the Baltic Sea States*. FOI Memo 5544.

[2] E.g. Nordlund, Peter and Åkerström, Janne (2012). *Försvarsutgifter i budgetkrisens spår – en försvarsekonomisk omvärldsanalys*. FOI-R--3508--SE, October.

[3] Berg, Ida Helene and Nyhus Kvalvik, Sverre (2015). *Makroøkonomiske trender 2015 – utvikling i norsk og internasjonal forsvarsøkonomi*. FFI-rapport 2015/00322.

[4] We define the Baltic Sea region as encompassing all the countries that border the Baltic Sea, and not just the three Baltics states. We also include Norway in our sample, as this Nordic country shares many of the security challenges of its neighbours. Our choice of the Baltic Sea region is motivated by the priorities set out by the Swedish government in its defence bill for the period 2016-20, see Försvarsdepartementet (2015). *Regeringens proposition 2014/15:109. Försvarspolitisk inriktning: Sveriges försvar 2016-2020*, pp. 23-33.

In addition to our primary audience at the Ministry of Defence, this study should also be of interest to the Ministry of Foreign Affairs. Furthermore, the econometric methodology employed should be of interest to the defence research community both in Sweden and internationally. We also believe that our analysis of global and regional defence spending should be of interest to the Swedish Armed Forces.

Research Questions

This report has three main research questions. The first question will be a recurring feature of the DEO series. The other two are linked to the focus topic of this report.

- What are the global trends in military expenditure?
- Can economic theory help us understand what drives military expenditure?
- What are the driving forces behind military expenditure in the Baltic Sea region?

Research Objectives

The research objectives are to describe the global trends in military expenditure and to present an overview of defence economic theory. In addition, the aim is to derive an econometric model from this theory to help explain the driving forces behind military expenditure in the Baltic Sea region. The purpose of using defence economic theory and econometric modelling is not only to deepen our understanding of military spending in the Baltic Sea region, but also to establish a methodology that can be used in future defence economic and security research at the Swedish Defence Research Agency, FOI.

Data

Our main data sources are data on military expenditure from the Stockholm International Peace Research Institute (SIPRI) and macroeconomic data from the International Monetary Fund (IMF).

The 2016 SIPRI data on military expenditure consist of time series on the military expenditure of 171 countries from 1988 to 2015. The SIPRI definition of military expenditure includes not just direct expenditure on the armed forces, but all spending on current military forces and activities, such as expenditure on paramilitary forces, military pensions, and research and development. It excludes civil defence expenditure. The main sources for SIPRI data on military expenditure are official data from national governments.[5]

[5] SIPRI (2016a). *Sources and methods*. Accessed 2016-04-06. For a general discussion on military expenditure and the conceptual and practical problems related to its measurement and definition see Brzoska, Michael (1995). "World Military Expenditures" in Hartley, Keith and Sandler, Todd. *Handbook of Defense Economics*. Volume 1, Oxford: North-Holland, pp. 45–67. For a discussion on the different definitions of military expenditure used by SIPRI, NATO, the UN, EDA and OSCE

Delimitations

This report focuses on military expenditure by governments and consequently does not include non-state actors, even though some terrorist organisations have substantial resources to wage war.

Our global outlook covers most of the world's countries. We divide these into four main regions: Europe and Russia, the Americas, Asia, and the Middle East and North Africa. No specific section has been devoted to sub-Saharan Africa, due to the limited time frame of this study. For the same reason, the discussion within each region is focused on the largest spenders and on the past decade. Our econometric analysis is limited to the Baltic Sea region.

Report Outline

Chapter 2 describes the trends in military expenditure and the defence industry as well as the economic outlook for the above-mentioned regions. This global outlook will be a standing feature of forthcoming DEO reports. Chapter 3 briefly discusses defence economic theory and presents our econometric model. Chapter 4 tests our model in order to identify the driving forces behind military expenditure in the Baltic Sea region. Chapter 5 summarises our findings. We also discuss possibilities for further development of our model and recommendations for future studies.

see Bergstrand (2015). *NATO Military Expenditures: Trends 2010-2015 with Projections for 2016-2020*, pp. 6-9.

2 Global Military Expenditure

Military expenditure is a measure that describes how much of its resources a country is willing to spend on its armed forces. While military expenditure does not automatically translate into military capability, which is also linked to resource allocation and efficient resource utilisation, it does give an idea of how countries measure up against each other. It also provides us a picture of how national defence is prioritised over time and in comparison with other public expenses.

Global military expenditure, like national income, varies drastically among the world's nations. Figure 1 shows that the largest military spenders in absolute terms are either advanced economies like the US, Japan, South Korea and the countries of Western European, or emerging economies such as China, India, Russia and Brazil.[6] An exemption to this general rule is oil-rich Saudi Arabia.

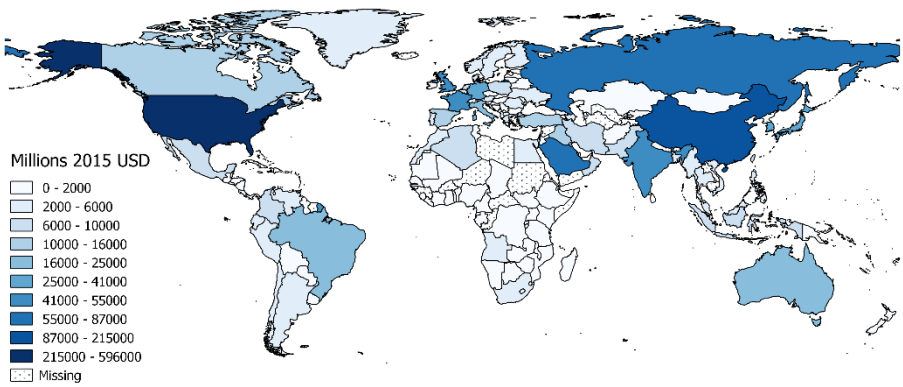


Figure 1: Global Military Expenditure, 2015 (Current Prices)

While this broad pattern may seem familiar to any long-time observer of global security, military expenditure is not static. In fact, much has happened in the past decade, as illustrated by Figure 2.

Larger versions of Figures 1 and 2 can also be found in Appendices A and B.

[6] Emerging economies often refer to the BRICs. However, it could be argued that resource dependent Russia has more in common with the economy of Saudi Arabia than the manufacturing giant China or the service hub India. The extent to which Brazil and Russia can still be defined as emerging is also open to debate.

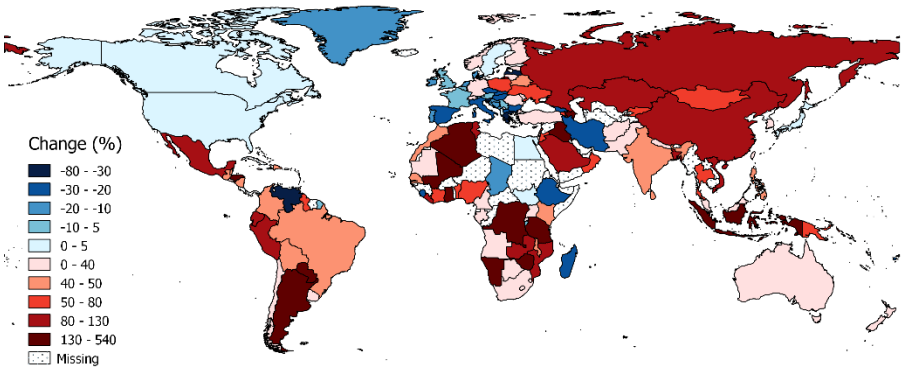


Figure 2: Global Military Expenditure, 2006-15 (2014 Constant Prices)

Almost all NATO countries cut their military spending over the 10-year period 2006-15. US spending cuts partly stem from the wind down of its engagements in Iraq and Afghanistan, but are also linked to the aftermath of the 2008 financial crisis. The financial crisis hit Western Europe as well, and these countries also had to deal with a subsequent fiscal crisis.

Meanwhile, China and Russia have drastically increased their military spending. While these increases are nowhere near enough to challenge the global dominance of the US, military spending by China and Russia has changed the regional security dynamic in East Asia and Eastern Europe respectively. In the Middle East, Saudi Arabia has increased its spending as the regional security situation has deteriorated. Some nations in sub-Saharan Africa have also increased their military budgets, but these increases are from a very low base.

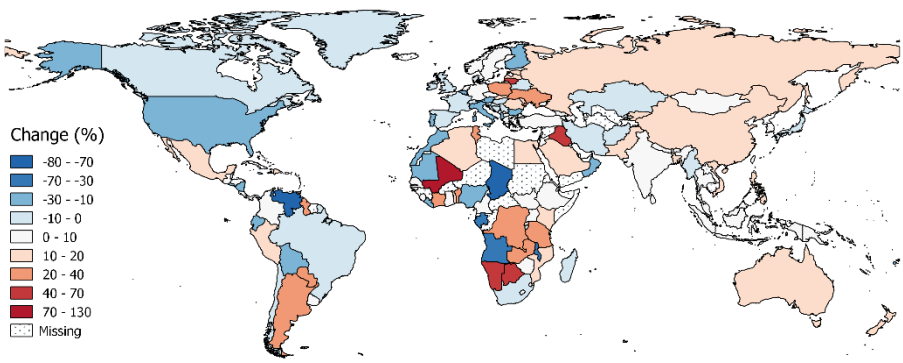


Figure 3: Global Military Expenditure, 2013-15 (2014 Constant Prices)

If the focus is shifted to the past three years, as shown in Figure 3, the picture becomes only slightly different. Most NATO members have continued to decrease

their spending while nations in East Asia, the Middle East and sub-Saharan Africa have increased theirs. But US spending cuts are more pronounced, while the Baltic Sea region and Eastern Europe emerge more clearly as a region characterised by increased military spending.

Table 1: Top 10 Military Spenders in the World 2015.[7]

Country	Billion USD	Times Sweden	Share of GDP (%)	Change 2006-15 (%)	Change 2013-15 (%)
US	596	110	3.3	-3.9	-8.4
China	215	40	1.9	131.7	17.2
Saudi Arabia	87	16	13.7	97.1	24.0
Russia	66	12	5.4	91.3	15.2
UK	55	10	2.0	-7.2	-1.7
India	51	10	2.3	43.1	5.6
France	51	9.5	2.1	-5.9	-3.1
Japan	41	7.6	1.0	-0.5	-0.1
Germany	39	7.3	1.2	2.8	1.6
South Korea	36	6.8	2.6	36.7	6.8

Table 1 summarises the discussion, focusing on the top ten spenders. At USD 596 billion or 110 times the level of Sweden, the US spends far more on its armed forces than any other country in the world. China is the world's second largest military spender and the largest in Asia.[8] While China's military spending is only slightly more than one-third of that of the US, it spends almost twice as much on

[7] Military expenditure in 2015, comparison with Sweden and share of GDP are calculated at current prices and exchange rates and are therefore sensitive to exchange rate fluctuations. However, they do give a correct comparative picture of actual spending. Changes in military expenditure over time are calculated at 2014 constant prices and 2015 exchange rates. All data is either from SIPRI (2016b). *Military Expenditure Database* or Perlo-Freeman, Sam; Fleurant, Aude; Wezeman, Pieter and Wezeman, Siemon (2016b). *SIPRI Fact Sheet: Trends in World Military Expenditure, 2015*.

[8] The numbers for China are SIPRI estimates, SIPRI (2016b). *Military Expenditure Database*. SIPRI estimates differ from official figures as they include military items and expenditure excluded from the latter. As China is the world's second largest military spender this is an important issue. However, for the purpose of comparability within this study we have chosen to rely on SIPRI estimates for all the included countries.

defence as neighbouring India, Japan and South Korea combined. Saudi Arabia outspends any other country in the Middle East by far.[9] Meanwhile, Russia is the largest military spender in Europe, outspending Sweden by a factor of 12, but it is not that far ahead of the UK or France.

Among the world's top ten military spenders, China increased its spending more than any other country in the period 2006-15, followed by Saudi Arabia and Russia. India has also increased its military spending at a rapid pace. The US, the UK and France have decreased their spending over the past decade.

The remainder of this chapter provides a more in-depth discussion, linking military expenditure to the overall security situation. The discussion covers the regions with the largest spenders on defence: Europe and Russia, the Americas, Asia as well as the Middle East and North Africa. Each section revolves around the biggest spenders in each region. We begin with Europe and Russia, as this region is the most relevant to Swedish security policy.

2.1 Europe and Russia

Russia is the largest military spender in Europe. The vast country has increased its military spending rapidly since the mid-2000s and seems to continue do so despite recent economic challenges. The UK, France, Germany and Italy are the largest spenders in Western Europe. All of these are NATO members. The 2008 financial crisis and the subsequent 2011 sovereign debt crisis hit Europe hard, forcing several EU member states to make big cuts to military and other public expenditure.

Table 2: Top 5 Military Spenders in Europe, 2015.[10]

Country	Billion USD	Times Sweden	Share of GDP (%)	Change 2006-15 (%)	Change 2013-15 (%)
Russia	66	12	5.4	91.3	15.2
UK	55	10	2.0	-7.2	-1.7
France	51	9.5	2.1	-5.9	-3.1
Germany	39	7.3	1.2	2.8	1.6
Italy	24	4.4	1.3	-30.4	-16.2

[9] Israel is the second largest spender in the Middle East at USD 16 billion, one-fifth of Saudi Arabia, SIPRI (2016b). *Military Expenditure Database*.

[10] Numbers are either from SIPRI (2016b). *Military Expenditure Database* or Perlo-Freeman et al. (2016b). *SIPRI Fact Sheet: Trends in World Military Expenditure, 2015*.

The debt crisis hit Western and Southern Europe hard, resulting in big reductions in defence spending in these countries, as seen in Figure 4. These cuts were achieved mainly by reducing force size rather than the overall scope of military capabilities.[11] Thus, while still advanced, European military forces have grown increasingly thin.

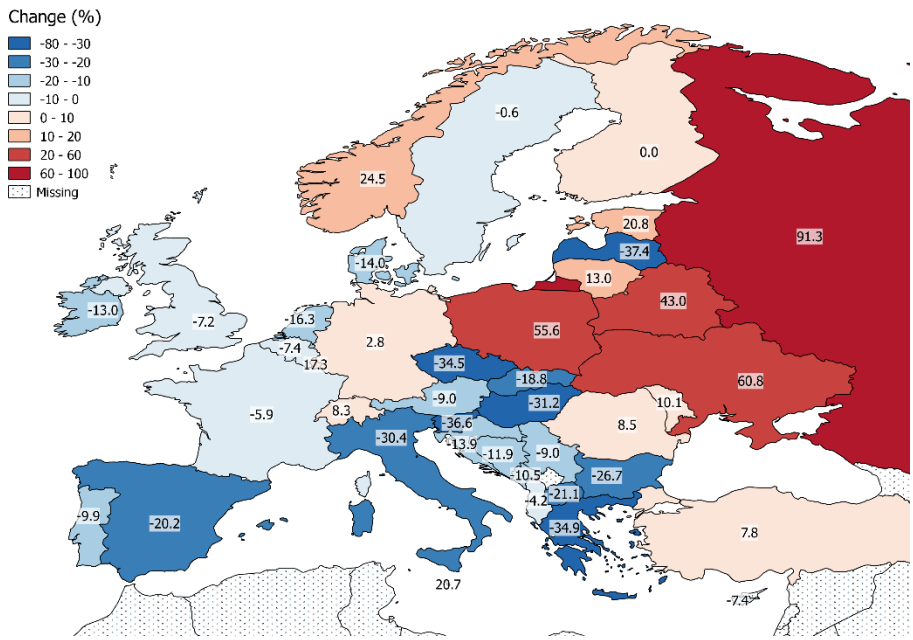


Figure 4: European Military Expenditure, 2006-15 (2014 Constant Prices)

Two recent security developments have made these force reductions problematic. First, Russia's 2008 invasion of Georgia, 2014 annexation of Crimea and subsequent aggression against Ukraine have dramatically altered the security situation in Eastern Europe. Second, the US pivot to Asia has put further pressure on European NATO members to carry more of their own military burden.

Regional Security

Russian military power quickly eroded after the break-up of the Soviet Union, and with it the fear of another major war on European soil. During the 1990s and 2000s many former members of the Warsaw Pact joined NATO and the EU. Meanwhile, Russia was plagued by internal problems and sought a closer relationship with the West.

[11] Marrone, Alessandro; De France, Olivier and Fattibene, Daniele, eds. (2016). *Defence Budgets and Cooperation in Europe: Developments, Trends and Drivers*. EDA, p. 37.

However, since the early 2000s relations have once again cooled and Russia has steadily increased its military spending. Russia's expanded ambitions include rapid modernisation of its ageing equipment, obsolete training methods and military organisation. The State Armament Programme,[12] GPV-2020, outlined an ambitious upgrading of the Russian arsenal. The programme's goal states that 70 per cent of all equipment should be *modern* by 2020. However, the definition of modern is left rather vague.[13]

Russia has also begun to challenge Europe's current NATO-dominated security order, most notably with the 2008 invasion of Georgia, the 2014 annexation of Crimea and its intervention in eastern Ukraine. The EU and the US responded by imposing political and economic sanctions on Russia and declaring their support for Ukraine. The conflict in eastern Ukraine is currently at a stalemate and a fragile armistice is in place, but the conflict remains unresolved and tensions are still high.

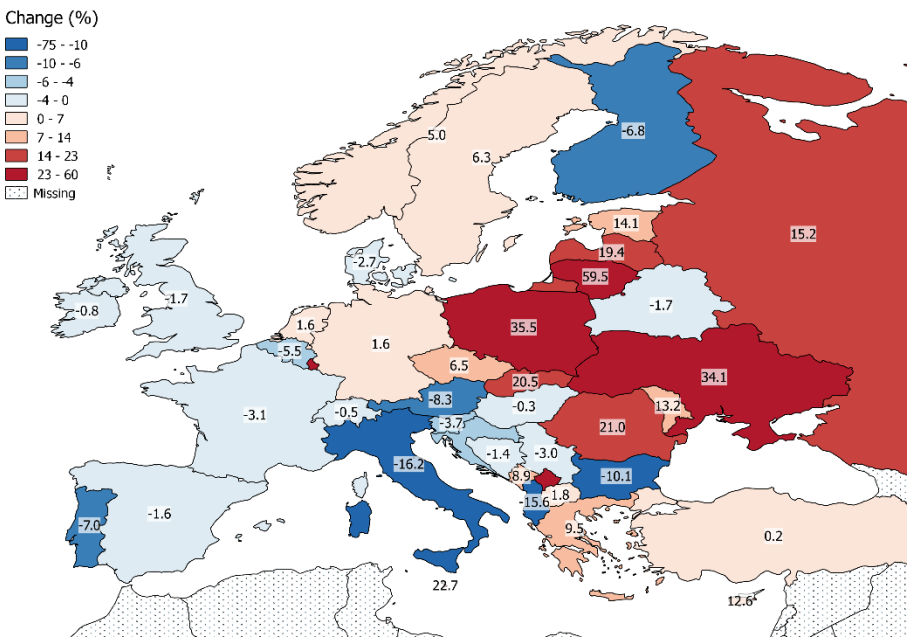


Figure 5: European Military Expenditure, 2013-15 (2014 Constant Prices)

There have been various European defence economic responses to Russian assertiveness in the past three years, as shown in Figure 5. Poland, Ukraine, the three Baltic States and several other Eastern European countries have increased

[12] Ru. *Gosudarstvennaia Programma Vooruzheniia*.

[13] Malmlöf, Tomas; Roffey, Roger and Vendil Pallin, Carolina (2013). "The Defence Industry" in Hedenskog, Jacob and Vendil Pallin, Carolina, eds. *Russian Military Capability in a Ten-Year Perspective*. FOI-R--3647--SE, December, p. 121.

their military expenditure significantly. Sweden and Norway and have also increased their military expenditure in the past three years. Denmark and Finland, however, have cut their military spending in recent years. And while most Western European countries have continued to cut their defence budgets, Germany and the Netherlands have increased their military spending in the past three years.

NATO's response to the increased threat level in Eastern Europe has been to improve its readiness, for instance by increasing the number and size of its exercises. The alliance is also striving to strengthen its response forces and improve multilateral planning and coordination.[14] At the Wales Summit in 2014 the European NATO members pledged to spend 2 per cent of GDP on defence.[15] This pledge, however, is a far cry from a commitment and it remains to be seen whether members can achieve their aim.

Outside NATO, military cooperation among European nations is fragmented, and often characterised by bilateral agreements or cooperation between a small number of countries. There is a political desire for deeper cooperation and integration but little EU-wide coordination.[16]

Beyond Europe's borders, several European countries have taken part in a range of international operations in the past decade, most notably in Afghanistan and Iraq. The 2011 airstrikes against Muammar Gaddafi's Libya were different from many other NATO operations in that it was France and the UK that took the lead.[17] Since August 2014, several European countries have also taken part in strikes against Daesh/ISIS in Syria and Iraq. In September 2015, Russia began its own campaign against rebel groups and jihadists in Syria, supporting the Syrian government of Bashar al-Assad.

The ongoing war in Syria and Iraq is linked to, but not the sole cause of, the rise of jihadism in Europe. Daesh claimed responsibility for the attacks in Paris in 2015 and Brussels in 2016. The French government halted its personnel cuts following the January 2015 Paris attack, citing terrorist attacks as the main reason.[18] Militant jihadism is a complex issue that muddies the waters between internal and external security. It has, however, further highlighted the need for coordination and cooperation between European security agencies.

[14] IISS (2016). "Chapter Four: Europe" in *The Military Balance*. 116:1, p. 63.
[15] NATO (2014). "Wales Summit Declaration", Press release 120, 5 September 2014. Accessed 2016-06-07.
[16] Marrone et al. eds. (2016). *Defence Budgets and Cooperation in Europe: Developments, Trends and Drivers*.
[17] Forsström, Anna; Sundberg, Anna and Winnerstig, Mike (2013). *Europas säkerhet och försvar i en ny tid*. FOI-R--3647--SE, March, pp. 28-29.
[18] Marrone et al. eds. (2016). *Defence Budgets and Cooperation in Europe: Developments, Trends and Drivers*, p. 17.

Defence Industry

The European defence industry mirrors the region's security policy. It is typically national, but there is a trend for increased cooperation and consolidation. One significant example of this development is the merger between German Krauss-Maffei Wegmann and French Nexter, both of which are suppliers of armoured vehicles.[19]

The UK has a large defence industry that employs about 300 000 people, and is dominated by BAE Systems. Companies are privately owned, but the government has a veto on strategic issues. The UK seeks defence cooperation primarily with the US but also with other European countries. It is for instance part of the Eurofighter project.[20]

The French defence industry employs about 165 000 people and is currently the world's fourth largest exporter of defence materiel.[21] The French government is very active in defence industrial policy. The state either fully owns or has a minority share through a holding company in several defence companies. France is also active in European defence industry cooperation, while at the same time valuing its self-sufficiency.[22]

Germany's defence industry is large and diversified. It is dominated by a number of industrial conglomerates, where defence equipment is often a division within the company. Like France, Germany favours European defence industry cooperation. Limited domestic demand has led the German defence industry to focus on exports of defence materiel. However, falling European demand and political restrictions on moral grounds have put pressure on defence exports.[23] Germany is currently the world's fifth largest exporter of defence materiel.[24]

The Russian defence industry is central to the country's military capability. The industry is large and diversified but fragmented and suffers from inefficiencies inherited from the Soviet era. State ownership or state control often politicise business. Corruption, lack of transparency and soft budget constraints continue to plague the military procurement process.[25] Russian defence companies have a comparatively large number of employees and often lack any incentive to increase productivity. Some efforts have been made to consolidate the industry, such as

[19] IISS (2016). "Chapter Four: Europe" in *The Military Balance*, p. 63.
[20] Forsström et al. (2013). *Europas säkerhet och försvar i en ny tid*. pp. 30-31.
[21] In the period 2011-15. Perlo-Freeman et al. (2016a). *SIPRI Fact Sheet: Trends in International Arms Transfers, 2015*, Table 1, p. 2.
[22] Forsström et al. (2013). *Europas säkerhet och försvar i en ny tid*, p. 37.
[23] Bäckström, Peter and Olsson, Per (2016). *Försvarsekonomi i fokus: Tyskland*. FOI Memo 5610.
[24] In the period 2011-15. Perlo-Freeman et al. (2016a). *SIPRI Fact Sheet: Trends in International Arms Transfers, 2015*, Table 1, p. 2.
[25] Oxenstierna, Susanne. "Defence Spending" in Hedenskog, Jakob and Vendil Pallin, Carolina, eds. (2013). *Russian Military Capability in a Ten-Year Perspective*, pp. 113-115.

restructuring firms into holding companies. However, these are also state controlled and the process is driven by politics rather than market rationale.[26] Nevertheless, the Russian defence industry is highly successful in the international market. Russia is the second largest exporter of military equipment in the world.[27] India and China are some of its more reliable customers. However, Eastern European countries such as Poland are reducing their stock of ageing Soviet equipment and shifting to more modern Western systems.[28]

Economic Outlook

Europe was hit hard by the 2008 financial crisis and the subsequent 2011 sovereign debt crisis. The economies of the EU member states started to recover in 2013, albeit at a slow pace.[29] Consumer confidence and the labour market outlook have improved but several risks remain. Levels of youth unemployment remain high and debt levels continue to weigh down economic growth. The inflow of refugees and migrants has been met by a lack of coherence among the EU members and put added strain on the budgets of many South and Western European countries.[30] Although the recent decision by the UK to leave the EU does not significantly alter the European security infrastructure, in which NATO plays a far more important role, Brexit could have seriously adverse effects on the economic development of both the UK and the EU.[31]

Following years of commodity-fuelled growth, Russia has been severely hit by the falling oil prices in recent years. The situation has been exacerbated by the country's aggression towards Ukraine and the consequent economic sanctions.[32] However, Russia's economy had been deteriorating for some time. The long term downward trend is linked to rent seeking from the petroleum economy and consequent lack of competition and innovation.[33] The Russian leadership sees the defence industry as a source of technological progress which could lift the Russian

[26] Malmlöf, Tomas; Roffey, Roger and Vendil Pallin, Carolina (2013) "The Defence Industry" in Hedenskog, Jacob and Vendil Pallin, Carolina, eds. *Russian Military Capability in a Ten-Year Perspective*, pp. 123-125.

[27] In the period 2011-15. Perlo-Freeman et al. (2016a). *SIPRI Fact Sheet: Trends in International Arms Transfers, 2015*, Table 1, p. 2.

[28] Marrone et al. eds. (2016). *Defence Budgets and Cooperation in Europe: Developments, Trends and Drivers*, pp. 23-24.

[29] IISS (2016). "Chapter Four: Europe" in *The Military Balance*, p. 60.

[30] The "added strain on budgets" refers to the short-term increase in fiscal expenditure required to manage the migration flow, any long-term costs or benefits of immigration are beyond the scope of this study.

[31] For a list of such potential effects see: Global Counsel (2015). *BREXIT: the Impact on the UK and the EU*.

[32] Oxenstierna, Susanne and Olsson, Per (2015). *The Economic Sanctions Against Russia: Impact and Prospects of Success*. FOI-R--4097--SE, June.

[33] Oxenstierna, Susanne (2014). *The Russian Economy: Can Growth be Restored within the Economic System?*, pp. 15-18. FOI-R--3876--SE, May.

economy.[34] However, given the constraints facing that particular industry, the success of a defence driven innovation strategy appears uncertain.

Demographically, Europe is ageing steadily and in many countries the population is stagnant or in decline. A shrinking population could theoretically be offset in part by technological advancements, such as robotics, to maintain economic productivity. However, ageing populations put increased pressure on health care and other social expenditure, a development that might crowd out future military spending. Recent migration could help, but this would require increased efforts to integrate migrants. These demographic problems are even more pronounced in Russia, where they may even affect national security. The shrinking and ageing population makes it more difficult to achieve the goal of keeping one million personnel in the armed forces.[35]

2.2 The Americas

In North and South America, the US and Brazil are the largest military spenders respectively. Even though the US has scaled back its defence spending in recent years, it still outspends all the other countries in the world by far. US military expenditure is over two-and-a-half times that of China and 110 times that of Sweden. It climbed steadily after the attacks on the US of 11 September 2001 with the subsequent wars in Afghanistan and Iraq.

The 2008 financial crisis hit the US economy hard, however, and after a peak in 2010 military spending declined. This was due in part to budget cuts in the aftermath of the financial crisis, but also a natural consequence of the withdrawals from Iraq and Afghanistan. Current US military spending is slightly lower than a decade ago, as shown in Figure 6.

[34] Oxenstierna, Susanne (2013). "Defence Spending" in Hedenskog and Vendil Pallin, eds. *Russian Military Capability in a Ten-Year Perspective*, pp. 106-107.
[35] Ibid., pp. 110-111.

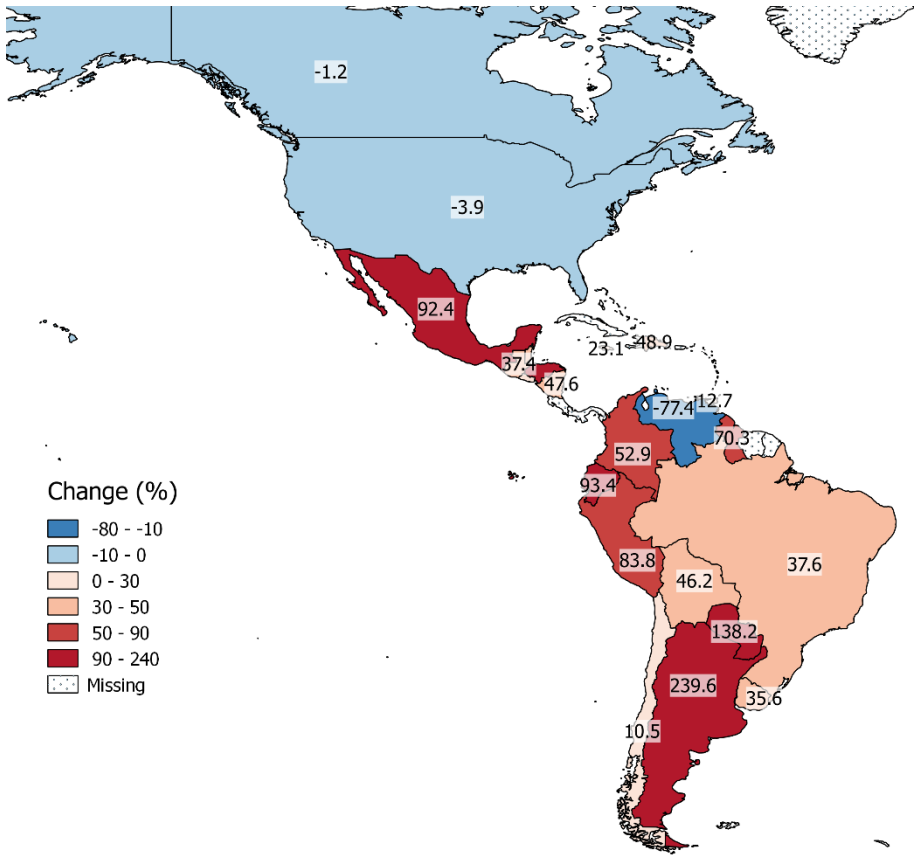


Figure 6: American Military Expenditure, 2006-15 (2014 Constant Prices)

Meanwhile, most Latin American countries have increased their military spending during the same period. Argentina has led the trend, tripling its military expenditure in the past decade. Brazil, the largest spender in South America, has also increased its spending, but not as fast as its neighbours and in recent years military expenditure has stagnated.

Table 3: Top 5 Military Spenders in the Americas, 2015.[36]

Country	Billion USD	Times Sweden	Share of GDP (%)	Change 2006-15 (%)	Change 2013-15 (%)
US	596	110	3.3	-3.9	-8.4
Brazil	25	4.6	1.9	37.6	-0.2
Canada	15	2.8	1.0	-1.2	-2.0
Colombia	9.9	1.8	3.5	52.9	-7.8
Mexico	7.7	1.4	0.7	92.4	14.6

Regional Security

In terms of military expenditure the US remains the world's sole superpower, but this does not mean that it faces the same world as a decade ago. Previously regarded as nearly invincible due to its vast technological superiority, the US is currently faced with the increasingly sophisticated and asymmetric capabilities of China and Russia. The US is still likely to win conventional conflicts, but any such victory now comes at a much higher price than a decade ago.[37]

Geography has not been altered, however, and the US has not faced a military threat from its neighbours for centuries. This is a huge strategic advantage. Instead, traditional US security interests and concerns are located overseas. After the end of the Cold War, Islamist terrorism together with smaller rogue states emerged as the main challenges for the US. In recent years, however, an emerging China and a more assertive Russia have once again put great power rivalry back on the agenda.

China's growing economic might and forceful claims to disputed islands in the East and South China seas have prompted the US to pivot towards Asia. In order to guard its interests and reassure regional allies, the US is aiming to deploy 60 per cent of its naval forces to the Pacific by 2020. The strategic importance of this redeployment should not be overstated, however, as over half the US Navy was already deployed in the Pacific prior to the pivot. Furthermore, China is far from the only challenge facing the US.[38]

[36] Numbers are either from SIPRI (2016b). *Military Expenditure Database* or Perlo-Freeman et al. (2016b). *SIPRI Fact Sheet: Trends in World Military Expenditure, 2015*.

[37] For a comprehensive force comparison see Heginbotham, Eric et al. (2015) *The U.S.-China Military Scorecard: Forces, Geography and the Evolving Balance of Power, 1996-2017*.

[38] Rossbach, Niklas H. (2015). *Amerikanska prioriteringar i Fjärran Östern: USA:s säkerhetspolitik och allianser i Asien och Stillahavsområdet*, FOI-R--4091--SE, June, p. 61.

Russia's annexation of Crimea and the subsequent war in eastern Ukraine have put pressure on the US to reassure its European NATO allies. Apart from sanctions on Russia, the US response has included increasing its ground forces and exercise activity in Eastern Europe.[39] In addition, while the US withdrew most of its forces from Iraq in 2011, continued instability has forced it to keep about 10 000 soldiers in Afghanistan. In August 2014 President Barack Obama announced airstrikes against Daesh in Iraq and Syria, which also require US attention and resources. These simultaneous challenges are occurring at a time when US policymakers face an electorate that is increasingly sceptical about foreign military commitments.[40]

In recent decades Central and South America have faced a set of security issues generally unrelated to territorial conflicts. Instead local insurgencies and organised criminal activity have been the major headaches in the region. El Salvador, Honduras and Guatemala have all used military force to counter violent crime. In Columbia, the long-running conflict between the government and the FARC guerrilla is currently at a crossroad.[41] A peace treaty was signed, but later narrowly rejected in a referendum. Overall, the region has become more secure. In spite of this, every country in South America except for Venezuela have increased their military spending in the past decade. Venezuela's oil-dependent economy has been suffered from the slump in global commodity prices.

Brazil is the largest spender on defence in South America, accounting for over 40 per cent of the region's total military expenditure. However, budget cuts and austerity measures have hit public spending, including a 25 per cent spending cut on defence procurement. This has delayed several priority programmes, although there has been no revision of its overall ambitions regarding national defence.[42]

Defence Industry

The US has the world's largest military industry and several of the largest defence companies. It is also the world's largest exporter of major weapon systems.[43] The industry is complex, complete and technologically advanced. Major developments include the F-35 multi-role stealth fighter, littoral combat ships, Zumwalt-class destroyers and Gerald R. Ford-class aircraft carriers. However, the US is not immune to problems with procurement. Cost overruns and delays have plagued the F-35 programme as well as the littoral combat ships. Some expensive projects

[39] E.g. *Wall Street Journal* (2016). "NATO Allies Preparing to put Four Battalions at Eastern Border with Russia", 29 April 2016; and *The Guardian* (2016). "NATO Countries Begin Largest War Game in Eastern Europe Since Cold War", 6 June 2016.

[40] Rossbach (2015). *Amerikanska prioriteringar i Fjärran Östern: USA:s säkerhetspolitik och allianser i Asien och Stillahavsområdet*, pp. 43-44.

[41] *Washington Post* (2016). "Colombian Government, Rebels Reach a Major Milestone in Peace Talks", 22 June 2016. Accessed 2016-08-03.

[42] IISS (2016). "Chapter Eight: Latin America and the Caribbean" in *Military Balance*, p. 369.

[43] In the period 2011-15. Perlo-Freeman et al. (2016a). *SIPRI Fact Sheet: Trends in International Arms Transfers, 2015*, Table 1, p. 2.

have even fallen victim to recent budget cuts, such as the cancellation of seven out of the ten planned Zumwalt destroyers.

The main US method of countering the growing anti-access/area denial capabilities of potential rivals is to maintain a technological edge coupled with advanced tactics. The US continues to invest in advanced technology, referred to as the third offset strategy. This includes robotics and direct energy weapons as well as innovative ideas that originate outside of the defence sector.[44] As noted above, the US is the world's largest exporter of defence equipment. Its allies in East Asia and the Middle East have been its biggest customers in the past decade.[45]

Brazil has a large and diverse defence industry with companies involved in aerospace, shipbuilding and the production of armoured vehicles, missiles, small arms and munitions. The defence industry mainly supplies the domestic market but Brazil is a net importer of military equipment. Large import projects in the near future include the Swedish Gripen NG multi-role fighter and the French-Spanish Scorpene-class submarine.[46]

Economic Outlook

Although the financial crisis began in the US, it recovered faster than most Western countries. Growth has been fairly stable since early 2009, but this growth has not benefitted all. The debate in the lead-up to the US presidential election in November 2016 has partly reflected public discontent over economic inequality.

The US pivot to Asia is not just a military matter, but also an economic one. The Trans-Pacific Partnership is designed to create business opportunities while also increasing US influence in Asia.[47] The Obama administration has also aimed to strengthen economic ties with Europe through the Transatlantic Trade and Investment Partnership. It remains to be seen whether the current administration's efforts to promote free trade will continue after the election.

The slowing global demand for commodities, following the financial crisis and the slowdown in China, hit Brazil hard. It has attempted to stabilise its debt-to-GDP ratio in order to maintain its investment grade status among the international rating agencies.[48] Corruption remains a problem. Recent scandals have forced the resignation of President Dilma Rousseff. It remains to be seen whether the 2016 Olympic Games will boost the Brazilian tourist industry in the longer term.

---

[44] IISS (2016). "Chapter Three: North America" in *Military Balance*, p. 28.
[45] SIPRI (2016c). *Arms Transfer Database.* Accessed 2016-08-03.
[46] Gripen NG is scheduled for delivery in 2019-24; four Scorpene-class submarines are scheduled from 2018 according to IISS (2016). "Chapter Eight: Latin America and the Caribbean" in *Military Balance*, pp. 371-372.
[47] Rossbach (2015). *Amerikanska prioriteringar i Fjärran Östern: USA:s säkerhetspolitik och allianser i Asien och Stillahavsområdet*, p. 38.
[48] IISS (2016). "Chapter Eight: Latin America and the Caribbean" in *Military Balance*, pp. 369-371.

2.3 Asia

Countries across East and South Asia have increased their military spending in the past decade, driven by rising GDP and a changed regional security dynamic.

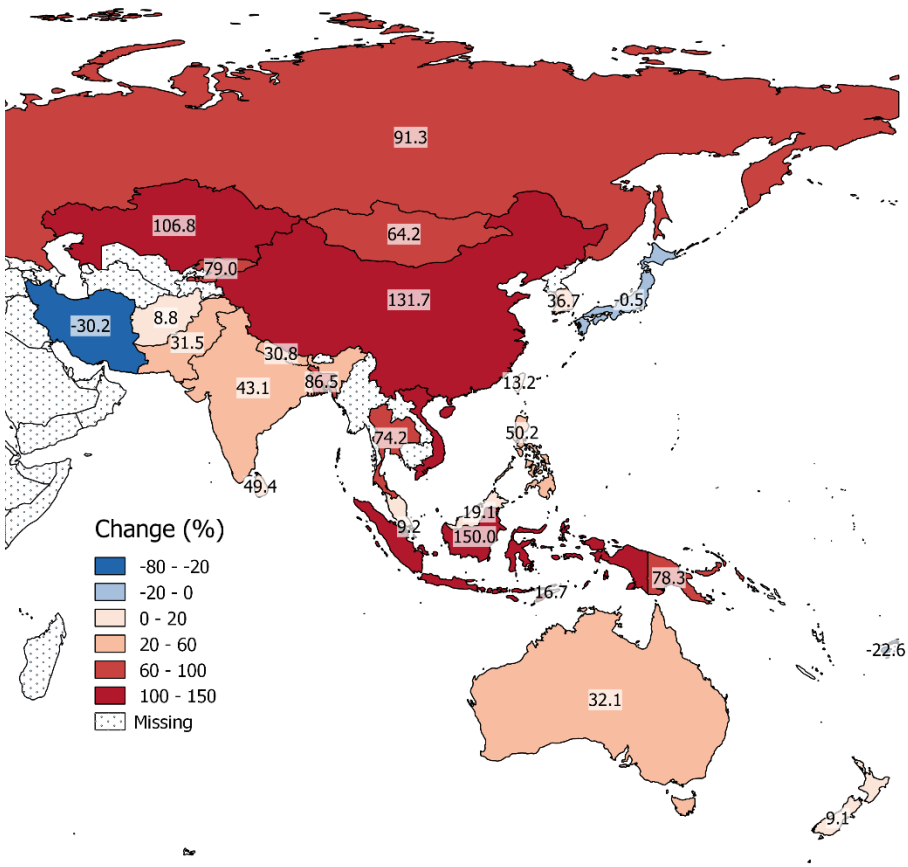


Figure 7: Asian Military Expenditure, 2006-15 (2014 Constant Prices)

China has been the largest military spender in Asia since the early 2000s. It is currently followed by India, Japan and South Korea. Australia is the largest spender in Oceania and the fifth largest spender in the western Pacific.

China has been steadily increasing its military spending since the 1990s, by 132 per cent over the past decade alone. This has been made possible by high and sustained rates of economic growth since the late 1970s. India has experienced rapid economic growth since the 1990s, and its military spending has increased by over 40 per cent in the past decade. In contrast, the more advanced economy of Japan has been stagnant since the early 1990s and military expenditure has

remained stable, largely due to the country's policy not to allocate more than one per cent of GDP to defence. South Korea has experienced healthy growth rates and increased military spending by over one-third in the past decade. Australia has increased its military spending by nearly one-third over the same period.

Table 4: Top 5 Military Spenders in Asia, 2015.[49]

Country	Billion USD	Times Sweden	Share of GDP (%)	Change 2006-15 (%)	Change 2013-15 (%)
China[50]	215	40	1.9	131.7	17.2
India	51	10	2.3	43.1	5.6
Japan	41	7.6	1.0	-0.5	-0.1
South Korea	36	6.8	2.6	36.7	6.8
Australia	24	4.4	1.9	32.1	17.0

Regional Security

East Asia is characterised both by economic integration and security tensions with several countries modernising their armed forces. Tensions are mainly driven by fear of a rising China, the same country that is at the centre of the region's economic integration. The smaller countries that benefit from the increased economic activity of their giant neighbour also fear being overshadowed by it. This fear has been exacerbated by recent territorial disputes, which mainly involve islands or reefs, such as the Senkaku/Diaoyu island conflict between Japan and China, or the conflicting claims of China, Vietnam, the Philippines, Malaysia, Brunei and Taiwan in the South China Sea.[51] The US has repeatedly sought to discourage China from continuing its construction of artificial islands, voiced concerns over freedom of navigation and shown political support for its regional allies. In turn, China has called US involvement outside interference and a destabilising factor. This great power rivalry in the South China Sea has stoked fears that a mistake could trigger an armed conflict between the world's two largest economies and military spenders.

[49] Numbers are either from SIPRI (2016b). *Military Expenditure Database, 1988-2015* or Perlo-Freeman et al. (2016b) *SIPRI Fact Sheet*: *Trends in World Military Expenditure, 2015*.

[50] The numbers for the People's Republic of China are SIPRI estimates, see SIPRI (2016b) *Military Expenditure Database*.

[51] Rydqvist, John; Holmquist, Erika; Neretnieks, Karlis and Bergstrand, Bengt-Göran (2014). *Västra Stilla havet: Säkerhetspolitiska trender på tio års sikt*, FOI-R--3907--SE, June, p. 30.

Aside from territorial disputes, reunification with Taiwan remains a priority for China. It has developed capabilities aimed at denying any third party intervention in a potential conflict should Taiwan seek formal independence.[52] In recent decades the Chinese People's Liberation Army (PLA) has undergone a rapid modernisation. The construction of a blue water navy has been given high priority, including the commissioning of modern destroyers, frigates and corvettes, as well as various submarine classes and the country's first aircraft carrier.[53] China has also developed a number of multi-purpose fighters, including two types of stealth prototype.[54] Although ground forces have been given less priority in recent decades, modern main battle tanks and attack helicopters have been added to the arsenal.[55] Cyber and space capabilities are also vital to China's security interests, and both are areas in which the country has made significant progress. In September 2015, President Xi Jinping announced that China is planning to reduce the size of its vast 2.3 million-strong armed forces by 300 000 as part of the modernisation process. However, the PLA still faces a number of challenges. While the pace of the modernisation has been impressive, most systems still lag behind their Western counterparts. Rapid modernisation has also created a wide array of systems, both modern and outdated, increasing the requirements for military logistics and complicating operations. Furthermore, PLA command and control structures have not developed at the same pace as its hardware.

India has had an ongoing rivalry with Pakistan ever since their independence from the British Empire and partition in 1947. The two countries have fought a series of wars, with Kashmir as the main cause of contention. Relations remain tense, but they have improved somewhat since India has concluded that the threat from jihadist terrorism could increase with an unstable Pakistan.[56] India was neutral between the superpowers during the Cold War, but leaned towards the Soviet Union. In recent decades, however, China's economic rise and military modernisation have prompted India to move closer to the US. India and China fought a brief war in 1962 and the border is yet to be permanently settled. Nonetheless, rivalry between the two Asian giants is characterised by political

[52] Ibid., pp. 47-48. For more on the military thinking of China regarding anti-access/area denial, as well as US thinking of how to counter this see Dalsjö, Robert; Korkmaz, Kaan and Persson, Gudrun (2015). *Örnen, Björnen och Draken: Militärt tänkande i tre stormakter*. FOI-R--4103--SE, September. The report also discusses Russian military thinking.

[53] The PLA Navy has commissioned several Type 52D destroyers, Type 54A frigates, Type 56 corvettes, Type 39A conventional and Type 94 nuclear submarines in recent decades, as well as the refurbished aircraft carrier the *Liaoning*.

[54] New multi-role fighters include the domestically developed Chengdu J-10B and stealth prototypes Chengdu J-20 and Shenyang J-31. IISS (2016). "Chapter Six: Asia" in *Military Balance*, pp. 223-224.

[55] The most modern Chinese tank is the Type 99A (called Type 99A2 in most Western media). China also has two modern types of attack helicopters, the Chengdu Z-10 and the Harbin Z-19.

[56] Atarodi, Alexander; Dalberg, Eva; Hellström, Jerker; Höstbeck, Lars and Rydqvist, John (2010). *India: A Defence and Security Primer*. FOI-R--2983--SE, May, pp. 26-27.

caution and economic cooperation. Both wish to avoid direct military confrontation, as they are dependent on stability and trade in order to provide economic growth for their massive populations. The manpower-intensive Indian Armed Forces are undergoing modernisation. The navy has added two new domestically developed destroyers in recent years and hopes to operate three aircraft carrier groups in the near future. The air force operates a vast number of aircraft, most of which are imported from various countries but some, such as the HAL Tejas, are domestically developed.[57]

Although Japan's military spending has been stagnant for the past decade, the island nation has revised several of its strategic security policies. Like many other changes in the region, these moves have largely been driven by the economic rise and increasing assertiveness of China. Japan is also concerned about the aggressive behaviour of the nuclear-armed North Korea. Recent policy changes include the removal of a constitutional ban on collective defence, relaxation of a rule on the export of technology, the provision of increased non-combat support to other nations and increased scope for UN peacekeeping duties.[58] While these changes have increased the mandate of its Self-Defence Forces, Japan's bilateral alliance with the US remains the central pillar of its security policy.[59]

For South Korea the most pressing threat to national security is still North Korea, which possesses a vast arsenal of conventional missiles and continues the development of its nuclear arsenal. South Korea is a US ally, an alliance which forms the core of its security policy, but also economically dependent on China.[60] At the same time, South Korea has a historically tense relationship with Japan, the other major US ally in North East Asia, and the territorial dispute with Japan over the Dokdo/Takeshima islands is ongoing.[61] South Korea is currently seeking to modernise its armed forces, which are already vastly technologically superior to those of North Korea. One reason for the modernisation is demography: an ageing population has brought forward its need to reduce the number of service personnel required.

East Asia is economically integrated but has weak transnational security organisations. Apart from ASEAN there is no real security cooperation in the Asia Pacific region.[62] The Shanghai Cooperation Organisation (SCO), which has China and

[57] The Indian Navy has commissioned several surface combatants in the past decade, among them two Kolkata-Class destroyers, three Shivalik-Class frigates, two Kamorta-Class corvettes and the refurbished aircraft carrier the *Vikramaditya*. The Indian Army mainly relies on T-90S tanks of Russian origin, but also operates the heavier domestic Arjun main battle tank.
[58] IISS (2016). "Chapter Six: Asia" in *Military Balance*, pp. 229-230.
[59] Rydqvist et al. (2014). *Västra Stilla havet: Säkerhetspolitiska trender på tio års sikt*, p. 49.
[60] Korkmaz, Kaan and Rydqvist, John (2012). *The Republic of Korea: A Defence and Security Primer*. FOI-R--3427--SE, April, pp. 44-46.
[61] Rydqvist et al. (2014). *Västra Stilla havet: Säkerhetspolitiska trender på tio års sikt*, pp. 35-38.
[62] Ibid., pp. 27-29.

Russia at its core, has been claimed by some analysts to be a counterweight to NATO. However, although common security is one of the organisation's main purposes and joint military exercises have been held, the SCO does not stipulate mutual defence and its members remain uncoordinated on security policy.[63]

Defence Industry

China's defence industry has modernised in tandem with the increasing requirements of the PLA. Although still reliant on Russia for several systems and on various Western countries for components, China has made great strides in developing its domestic defence industry. These include the incorporation of advanced foreign and civilian technologies. China is also attempting to address the Soviet-style management structures in its state-owned defence companies, in an effort to make them more flexible and competitive.[64] In recent years, China has made some progress in the international arms market and is currently the world's third largest arms exporter.[65]

India also has an ambitious modernisation programme. As a consequence of its historical ties with the Soviet Union, most Indian military equipment is of Soviet or Russian origin. India is currently the largest importer of major weapon systems,[66] and is reliant on foreign technology. However, the current Indian government is pushing forward with an ambitious plan to encourage foreign direct investment in the defence industry, removing red tape and supporting high-tech production.[67]

Japan has an advanced defence industry dominated by large industrial conglomerates, or *keiretsu*. Japanese domestic defence companies are capable of producing advanced main battle tanks, multi-purpose fighters, surface combatants and submarines. The industry has historically been limited to supplying the Japanese Self-Defence Forces, but restrictions on technology transfer have recently been relaxed somewhat.

South Korea is also striving to modernise its armed forces and reduce its troop numbers. Similarly to Japan, South Korea's defence industry is dominated by conglomerates, or *chaebol*. Although certain systems and components still need to be imported, the South Korean defence industry has become increasingly advanced

[63] These general observations have not changed since the publication of Oldberg, Ingmar (2007). *The Shanghai Cooperation Organisation: Powerhouse or Paper Tiger*. FOI-R--2301--SE, June.
[64] IISS (2016). "Chapter Six: Asia" in *Military Balance*, pp. 226-227.
[65] In the period 2011-15. Perlo-Freeman et al. (2016a). *SIPRI Fact Sheet: Trends in International Arms Transfers, 2015*, pp. 1-2.
[66] In the period 2011-15, ibid., Table 2, p. 4.
[67] Bergenwall, Samuel (2015). *Indiens växande ekonomiska och strategiska betydelse*. FOI Memo 5339.

and self-reliant in the past decade.[68] The domestically produced K-2 main battle tank, for instance, is comparable to or even more advanced than its Western counterparts. South Korean shipbuilders have also produced modern destroyers and frigates, as well as submarines and a helicopter carrier.

Economic Outlook

Asia, particularly East Asia and especially China, has witnessed remarkable growth rates in recent decades. As many of the region's exports have their final market in the West, East Asia has struggled to maintain high growth rates in the aftermath of the 2008 financial crisis and the subsequent sovereign debt crisis in Europe. However, the recent slowdown is not only due to reasons outside of Asia.

China's slowing growth rate, from double digits to slightly below 7 per cent, has structural as much as cyclical causes. Structural economic slowdown is natural as an economy matures but China also faces problems with rebalancing its economy. The investment- and export-driven growth model has run out of steam and domestic consumption has only been partly successful at replacing infrastructure and manufacturing as the main economic growth engine.[69] The slowdown is also a consequence of the high level of debt largely incurred by the USD 586 billion stimulus package launched after the 2008 global financial crisis. Although central government finances are relatively sound, high levels of local government and corporate debt present huge challenges for the Chinese economy. This could in turn have a long-term effect on China's ability to maintain high levels of spending on its military. Moreover, China's population is ageing rapidly, even more than elsewhere, as a side effect of the one-child policy. This is not a serious problem today, but could present problems in the future.

India has recovered well from the aftermath of the global financial crisis and its 2015 growth rate of 7.6 per cent made it the fastest growing large economy in the world. In recent decades the service sector has led the Indian growth story, while industrial output has lagged. The current government of Prime Minister Narendra Modi is aiming to change that with the "Make in India" campaign, which encourages foreign direct investment in manufacturing.[70] The Indian Parliament recently enacted a unified goods and services tax, which also has the potential to further stimulate economic activity. Rapid growth will help the Indian Armed Forces in their modernisation efforts. However, India's economy is one-fifth the size of China's and its military budget just a quarter. As a consequence, a sustained period of higher growth rates will be required before power relations between the two are changed. But India's demographic outlook is positive. The country's

[68] Korkmaz and Rydqvist (2012). *The Republic of Korea: A Defence and Security Primer*, pp. 51-53, 70-73.

[69] This may not be all that surprising, since consumer income is to a large extent earned in the construction and manufacturing sectors.

[70] Bergenwall (2015). *Indiens växande ekonomiska och strategiska betydelse*.

working age population will peak in the coming decades. In the early 2020s, India will surpass China as the world's most populous country. While this may provide a so-called demographic dividend, it also poses challenges. India needs to find productive employment for the hundreds of millions in the workforce, as well as for the tens of millions about to join.

Japan has experienced slow growth and even stagnant economic activity since the early 1990s. The current administration of Prime Minister Shinzo Abe has made several efforts to tackle Japan's long run economic problems. Monetary easing, fiscal stimulus and structural reform were meant to end deflation and return the Japanese economy to growth. Monetary easing and fiscal expansion weakened the yen and helped Japanese exports, but the increase in value added tax needed to tackle the high level of sovereign debt put negative pressure on the economy. The results of these reforms have so far been mixed. Continued slow growth and high levels of government debt limit Japanese defence spending, even though the current administration has taken a more assertive stance on national security. Japan is also facing a demographic problem: the population is currently shrinking and continues to age.[71] This has consequences for the recruitment base of the Self-Defence Forces, but will present even greater challenges for the Japanese economy.

South Korea was hit hard by the 2008 financial crisis but recovered quickly due to a fiscal stimulus and rising domestic demand. Exports have also recovered. The South Korean economy is diverse, but the maturing economy is growing more slowly now than at its peak in the 1980s. Continued growth and its advanced civil industry will help South Korea maintain and increase its technological lead over neighbouring North Korea. However, the population is ageing rapidly. In the decades to come, this will present South Korea with similar problems to those facing Japan now.

2.4 The Middle East and North Africa

The volatile security situation in the Middle East and North Africa (MENA) makes data collection for this region difficult. There is therefore a lot of missing data. This section discusses only the data that is available.[72] Saudi Arabia is by far the largest spender in the Middle East, followed by Israel, Turkey and Iraq. Saudi Arabia has rapidly increased its spending in the past decade, as seen in Figure 8. The increases by Turkey and Israel can be described as barely marginal. Algeria,

[71] Rydqvist et al. (2014). *Västra Stilla havet: Säkerhetspolitiska trender på tio års sikt*, p. 11.

[72] The UAE was the second largest military spender in 2014 and is therefore highly likely to be among the top spenders in 2015. However, since the country is not in the 2015 data set it has been excluded from our study. This exclusion does not change the overall picture of regional security presented in this report, as the UAE shares many of the foreign policy ambitions and defence economic characteristics of Saudi Arabia.

the largest spender in North Africa, has increased its spending threefold. Meanwhile Iran, Saudi Arabia's and Israel's primary security concern, decreased its military spending over the past decade.

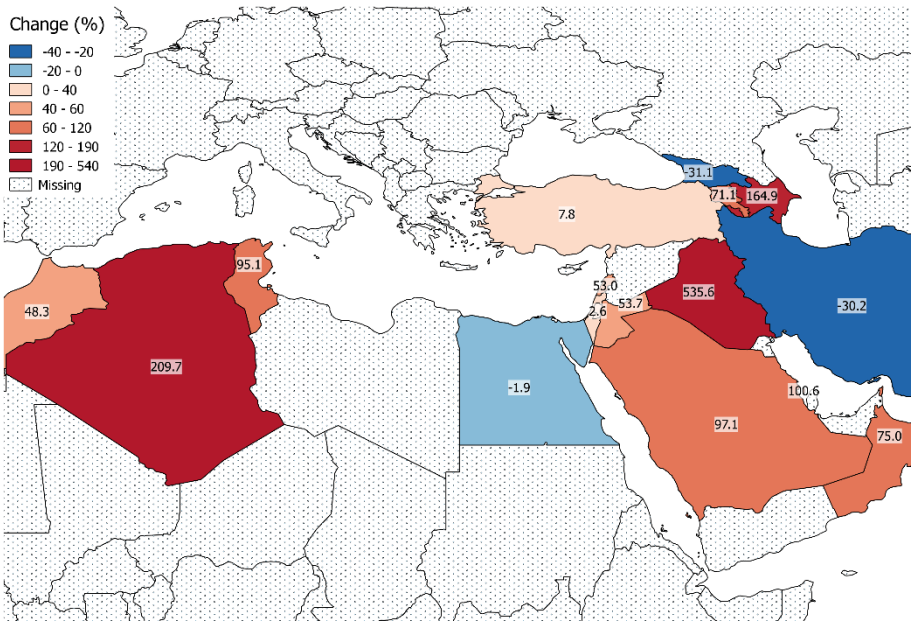


Figure 8: MENA Military Expenditure, 2006-15 (2014 Constant Prices)

The largest spending increase in the past decade was by Iraq, which is not surprising given that the war-torn country has had to rebuild its armed forces and is fighting an intense war against Daesh.

Table 5: Top 5 Military Spenders in MENA, 2015.[73]

Country	Billion USD	Times Sweden	Share of GDP (%)	Change 2006-15 (%)	Change 2013-15 (%)
Saudi Arabia	87	16	13.7	97.1	42.2
Israel	16	3.0	5.4	2.6	2.4
Turkey	15	2.8	2.1	7.8	2.4
Iraq	13	2.4	9.1	535.6	59.5
Algeria	10	1.9	6.2	209.7	18.3

Regional Security

The Middle East is rife with conflict and has been so for a long time. Jihadist terrorism, ethnic tension, repressive governments, and religious and great power rivalry plagued the region even before the 2003 US-led invasion of Iraq, the 2011 NATO intervention in Libya and the ongoing war in Syria. Nonetheless, the power vacuum left behind after authoritarian dictators such as Saddam Hussein and Muammar Gaddafi were ousted undoubtedly helped the spread of jihadist terror. The fractured Iraqi state became a centre for terrorist activity. Shiite dominance of the federal government increased resentment among Iraqi Sunnis, a resentment exploited by terrorist organisations such as Daesh. In addition, as the Syrian regime of Bashar al-Assad lost control over much of the country, Daesh expanded and quickly established itself as the extremely brutal, heavily armed and well organised jihadist movement we have seen in the past years.

The regional rivalry between Saudi Arabia and Iran has exacerbated regional instability, as demonstrated by the Saudi-led intervention in Yemen. While the Arab Spring gave brief hope of democratic development in the Middle East, the movement was hijacked by Islamist and other non-democratic forces. Egypt had returned to military rule by 2013, while Yemen, Libya and Syria have each descended into civil war and chaos.[74] Only Tunisia, where the Arab Spring began

[73] Numbers are either SIPRI (2016b). *Military Expenditure Database*; or Perlo-Freeman et al. (2016b). *SIPRI Fact Sheet: Trends in World Military Expenditure, 2015*.

[74] The war in Syria has also triggered a massive refugee crisis in the Middle East. Of the 5.9 million Syrian refugees, 4.8 million or 81 per cent have fled to Turkey, Lebanon, Jordan, Iraq and Egypt, according to UNHCR numbers cited in *Dagens Nyheter* (2016). "Världen stoppar hellre flyktingar än kriget". Accessed 2016-09-05.

in 2010, has experienced some democratic development.[75] Meanwhile, the Israeli-Palestinian conflict remains as unresolved as ever.

Saudi Arabia has almost doubled its military expenditure in the past decade. Internal security threats are not strong enough to challenge the Saudi monarchy and the ongoing rivalry with Iran is unlikely to lead to open war.[76] Instead, the two are fighting through proxy conflicts, such as the recent intervention by Saudi Arabia and the UAE against the Houthi rebels in Yemen, who are allegedly backed by Iran.[77] The Saudi Arabian monarchy is one of the closest US allies in the region. However, the US disengagement from Iraq and pivot towards the Asia-Pacific may have contributed to the Saudi increase in military spending.

Since its foundation, Israel has built a strong and capable military force supported by an advanced domestic defence industry and financial backing from the US. Throughout its history the country has fought a number of largely successful wars against its Arab neighbours. In the past decade, only Iran and its allies can be said to have posed any serious external security threat to Israel.[78] The Palestinian conflict is ever present and remains unresolved after the 2013-14 peace talks were suspended. Israel continues to answer terrorist attacks with overwhelming military superiority. During the summer of 2014 Israel and Hamas fought each other in a short but bloody conflict, centred on Gaza.

Turkey is a long-time member of NATO and an important US ally in the Middle East. In the decades following the Cold War, its main concerns have been internal security problems, most notably Kurdish separatism in the East. After the breakdown of the 2012 ceasefire, Turkey carried out military strikes against Kurdish fighters in 2015 not only within its own borders, but also in Syria and Iraq.[79] Turkey has been the target of a number of terrorist attacks in recent years, some of which have been attributed to Kurdish groups, others to Daesh. Another historical security challenge comes from the country's own armed forces. Turkey has a long history of military coups. The government of President Recep Tayyip Erdogan has worked to limit military involvement in politics and for some time the armed forces seemed to be accepting civilian rule.[80] Tensions remained, however, and these resurfaced with the attempted coup in July 2016. However, the

[75] Bergenwall, Samuel and Eriksson, Mikael (2014). *Mellanöstern och Nordafrika i ett 5-10-årsperspektiv*. FOI-R--4103--SE, December, p. 12-18.

[76] Hassan-Yari, Houchang (2016). "Middle East Warfighting Capabilities in 2025" in Holmquist, Erika and Rydqvist, John, eds. *The Future of Regional Security in the Middle East: Expert Perspectives on Coming Developments*. FOI-R--4251--SE, April, pp. 104-105.

[77] IISS (2016). "Chapter Seven: Middle East and North Africa" in *Military Balance*, pp. 307-308, 314.

[78] Hassan-Yari (2016) in Holmquist and Rydqvist, eds. *The Future of Regional Security in the Middle East: Expert Perspectives on Coming Developments*, pp. 103-104.

[79] *BBC News* (2016). "Turkey v Syria's Kurds v Islamic State", 19 February 2016. Accessed 2016-08-11.

[80] Korkmaz, Kaan (2014). *Försvarspolitik och försvarsmodernisering i Turkiet*. FOI Memo 4993, pp. 6-7.

coup failed to gain the backing of most of the armed forces and was highly uncoordinated. The hard line response from President Erdogan has increased tensions with the US and the EU, both of which have urged restraint. The failed coup will harm the domestic prestige of the armed forces and the subsequent purge of high-ranking officers is likely to affect its capability for some time to come.

Given the ongoing conflicts and the complexity of overlapping religious, ethnic and national interests, it is not surprising that there is only limited security integration in the Middle East. Saudi Arabia, Egypt and Israel have historically relied on their respective bilateral ties with the US, and Turkey on its NATO membership, while Libya under Gaddafi favoured the African Union. Even among Arab states security cooperation is fractured. In the 1950s there were attempts to promote pan-Arabism as a unifying force, but mistrust among the Arab states prevented a regional identity from taking hold.[81] The Gulf Cooperation Council was formed in the 1980s to promote cultural, economic and security cooperation among the Gulf monarchies.[82] The organisation's security focus was originally on internal security, but all the members except Oman have rallied behind the Saudi-led intervention in Yemen.[83]

Defence Industry

Saudi Arabia has some domestic defence industry, producing small arms and components. However, Saudi Arabia relies heavily on arms imports and is the world's second largest importer of major weapon systems. Its primary suppliers are the US and the UK.[84]

Israel has a technologically advanced defence industry, which has long contributed to the country's military edge over its regional rivals.[85] Israeli defence companies produce a vast variety of arms, from small arms such as the Uzi submachine gun, to Barak-series missiles and UAVs to Merkava main battle tanks.

Turkey has historically been dependent on Western, mostly US, defence suppliers. Since the mid-1980s, however, the country has sought to build a capable domestic defence industry. The Turkish defence industry is now capable of producing a wide

[81] Lins de Albuquerque, Adriana (2016), "Analysing Security in the Middle East from a Regional Perspective" in Holmquist, Erika and Rydqvist, John, eds. *The Future of Regional Security in the Middle East: Expert Perspectives on Coming Developments*, pp. 22-23.

[82] The six members of the Gulf Cooperation Council are Saudi Arabia, the United Arab Emirates, Oman, Bahrain, Kuwait and Qatar. Ibid., p. 21.

[83] IISS (2016). "Chapter Seven: Middle East and North Africa" in *Military Balance*, pp. 314-315.

[84] In the period 2011-15. Perlo-Freeman et al. (2016a). *SIPRI Fact Sheet: Trends in International Arms Transfers, 2015*, Table 2, p. 4.

[85] Hassan-Yari (2016) in Holmquist and Rydqvist, eds. *The Future of Regional Security in the Middle East: Expert Perspectives on Coming Developments*, p. 103.

array of weapon systems either domestically or in cooperation with other countries. Turkey is participating in the F-35 programme and developing a new main battle tank, UAVs and corvettes.[86]

Economic Outlook

In addition to the number of ongoing conflicts, the fall in the global oil prices in 2014 hurt many of the oil dependent economies in the Middle East. Many countries face budget deficits, especially in the light of the many promises on public spending made in the aftermath of the Arab Spring.

Saudi Arabia has been hit hard by the falling oil prices, caused by both falling demand from commodity importers, primarily China, and the increased supply of US shale oil. The current budget deficit is about 5 per cent of GDP and Saudi Arabia was forced to use USD 65 billion of its USD 730 billion foreign reserves to support public spending in January 2015.[87]

Israel's economy is growing at a modest but steady pace. Unlike most of the other economies in the Middle East, the Israeli economy is helped by low oil prices. Nonetheless, export performance has been dampened by slowing global demand, and international volatility remains a problem.[88]

Turkey has experienced rapid economic growth in the past decade. Its economy grew by an average around 6 per cent per year between 2002 and 2011,[89] but recently growth has slowed. There are several external reasons, such as falling demand from the EU and geopolitical uncertainty with Syria next door, but Turkish economic performance has also been hampered by a lack of reform.[90] Tourism has been hit by the recent terrorist attacks. It remains to be seen how the 2016 coup attempt will affect the Turkish political and economic climate, so far the signs have not been encouraging.

[86] Korkmaz (2014). *Försvarspolitik och försvarsmodernisering i Turkiet*, pp. 4-5.
[87] IISS (2016). "Chapter Seven: Middle East and North Africa", in *Military Balance*, p. 316.
[88] OECD (2016). "Israel Economic Forecast". Accessed 2016-08-12
[89] Korkmaz (2014). *Försvarspolitik och försvarsmodernisering i Turkiet*, pp. 4-5.
[90] The World Bank (2016). "Overview: Turkey", 7 April 2016. Accessed 2016-08-15.

3 Defence Economic Theory

Chapter 2 showed how military expenditure varies between countries and across regions. The traditional large spenders, such as the US and the countries of Western Europe, have decreased their defence spending in the past decade, while emerging regional powers, such as China, Russia and Saudi Arabia, have increased theirs dramatically. These changing regional security dynamics renew the need to understand the economics behind military expenditure.

A starting point in thinking about military spending from an economic perspective is to regard the situation as a standard optimisation problem.[91] Within this framework, any government can choose between military and civil goods in order to provide welfare to society. However, resources are limited, so the government must balance the benefits received from military spending with its opportunity cost, that is, the civilian goods and services that could have been provided with the same resources. What factors determine the balance between military and civilian spending? Ultimately, this question becomes an issue of determining society's willingness to pay for security and protection.

Defence spending is not a purely economic issue, which makes a theoretical analysis of defence spending difficult. Instead, as Eftychia Nikolaidou argued in an article from 2008, the level of defence spending is determined by a mixture of economic, strategic, political, psychological and even moral factors.[92] Furthermore, Todd Sandler and Keith Hartley highlight the complex political and bureaucratic processes that determine the level of defence spending in a given country.[93] A wide variety of models of the demand for military expenditure have been developed over the years to try to capture the range of influences on the decision-making process that determines military spending. Hartley gives an excellent summary of the wide range of potential influences on military expenditure in his 1991 book, *The Economics of Defence Policy*:

> The demand for military expenditure will be influenced by society's preferences, and its willingness to pay for defence will be affected by its perception of the threat and by the political composition of the government. Threats might take the form of actual involvement in conflicts or an arms race with potential enemies. Demand will further be influenced by household income levels, by the relative prices of military and civil goods, by spill-ins in the form of military expenditure by a nation's allies and by

[91] Hartley, Keith (1991). *The Economics of Defence Policy*. First edition, UK: Brassey's.
[92] Nikolaidou, Eftychia (2008). "The Demand for Military Expenditure: Evidence from the EU15 (1961-2005)". *Defence and Peace Economics*, 19(4), pp. 273-292.
[93] Sandler, Todd and Hartley, Keith (1995). *The Economics of Defence*. Cambridge: Cambridge University Press.

> strategic doctrine. Supply side factors comprise technical progress, economic growth and the economy's productive capacity.[94]

An example of a standard neoclassical model of demand for military expenditure where the state acts as a maximiser of welfare is the model presented by Ron Smith in the *Handbook of Defense Economics*.[95] The empirical specification of this model uses the civilian output (i.e. income) of a country, population and the country's *strategic environmen*t (i.e. the military expenditure of other countries) as the main determinants of military expenditure in a given country. More recent writers, such as Karl Skogstad, Eftychia Nikolaidou and J. Paul Dunne et al., make a distinction between internal and external factors.[96]

Internal factors include economic factors (e.g. income and prices), political factors (e.g. industrial policy) and bureaucratic factors (e.g. bargaining within government). These factors can play an important role in determining military expenditure and have been investigated in a range of studies.[97] However, as Hartley points out, perceptions of the threat to a country's national interests are an obvious starting point for any explanation of military spending.[98] Such factors can be considered *external* influences on the demand for military expenditure, and are to some extent represented by the military spending of potential enemies, or of allies. These factors are captured in arms race models and economic models of alliances, where military expenditures can be regarded as either signals of threat or signals of cooperation within an alliance.

Arms race models start from the approach that a country's military expenditure is undertaken in response to a threat that is believed to have come from a potential rival state or states.[99] Arms races that have been subject to previous studies include the US-Soviet superpower rivalry during the Cold War, India and Pakistan, and North and South Korea. Research in this field is often based on the Richardson model of arms race, one of the best known formal models in the international relations literature on this action-reaction relationship of military spending.[100]

---

[94] Hartley (1991). *The Economics of Defence Policy*, p. 59.

[95] Smith, Ron (1995). "The Demand for Military Expenditure" in Sandler, Todd and Hartley, Keith, eds. (1995) *Handbook of Defence Economics*. Volume 1, Oxford: North-Holland.

[96] Skogstad, Karl (2016). "Defence Budgets in the Post-Cold War Era: A Spatial Econometrics Approach". *Defence and Peace Economics* 27(3), pp. 323-352; Nikolaidou (2008). *Defence and Peace Economics*, pp. 273-292; and Dunne, J. Paul; Nikolaidu, Eftychia and Mylonidis, Nikolaus (2003). "The Demand for Military Spending in the Peripheral Economies of Europe". *Defence and Peace Economics* 14(6), pp. 447-460.

[97] See e.g. Griffin, Larry J.; Wallace, Michael and Devine, Joel A. (1982). "The Political Economy of Military Spending: Evidence from the United States". *Cambridge Journal of Economics* 6, pp. 1-14.

[98] Hartley (1991). *The Economics of Defence Policy*, p. 44.

[99] Ibid.

[100] Richardson, Lewis F. (1960). *Arms and Insecurity: A Mathematical Study of Causes and Origins of War*. Pittsburgh: Boxwood Press.

According to some authors, the empirical support for this mainly descriptive model has been shown to be weak when studies have tried to apply it to the data.[101] However, a recent article by Karl Skogstad highlights a country's geographical location when setting defence budgets. He found defence budgets to be positively spatially correlated, i.e. that there is a geographical association between the military expenditure of different countries.[102]

Early economic models of alliances viewed a military alliance as a voluntary club that provides a public good in the form of collective defence or deterrence. Membership of the club, however, comes at a cost. Countries will only join the alliance and stay in it as long as it offers more protection – and lower defence costs – compared to complete independence.[103] Pioneering work within this public good framework includes Olson and Zeckhauser's classic model of alliances.[104] The model predicts that the more defence a country's allies provide, the less the country tends to spend on defence by itself. This behaviour is often labelled *free-riding* within an alliance.[105] Furthermore, since the individual members of an alliance make choices based on their individual interests, rather than the collective interests of the whole alliance, the provision of defence within the alliance will be suboptimal, meaning that if the alliance had been a country by itself more defence would have been provided.

This model of behaviour within an alliance was later developed in the light of changing spending patterns within the NATO alliance during the Cold War. At this time, it was observed that the smaller members tended to take on larger proportions of the defence burden as NATO doctrine shifted from mutually assured destruction to a policy of flexible response.[106] This development was explained using a *joint product model*, in which military spending by its members provided multiple benefits for the organisation. These benefits could differ in public good content and a distinction was made between deterrent and protective or conventional forces. Alliances specialising in nuclear deterrence, for example, are expected to be characterised by free-riding to a greater extent than alliances that rely on conventional forces. The burdens within an alliance in which joint

[101] Dunne et al. (2003). "The Demand for Military Spending in the Peripheral Economies of Europe". *Defence and Peace Economics*, p. 453; and Li, Chien-pin (1997). "Fear, Greed, or Garage Sale? The Analysis of Military Expenditure in East Asia". *The Pacific Review*, 10(2), 274-288, p. 276.

[102] Skogstad (2016). *Defence and Peace Economics* 27(3), pp. 323-352.

[103] Hartley (1991). *The Economics of Defence Policy*.

[104] Olson, Mancur Jr. and Zeckhauser, Richard (1966). "An Economic Theory of Alliances". *Review of Economics & Statistics* 48(3), pp. 266-279.

[105] Sandler and Hartley (1995*). The Economics of Defence*.

[106] For a more recent investigation of the spending patterns within NATO and the EU see Amara, Jomana (2008). "NATO Defence Expenditure: Common Goals or Diverging Interests? A Structural Analysis". *Defence and Peace Economics* 19(6) and Kollias, Christos (2008). "A Preliminary Investigation of the Burden Sharing Aspect of a European Union Common Defence Policy". *Defence and Peace Economics*, 19(4), respectively.

products are present can therefore be expected to be shared more in accordance with the benefits received.[107]

In sum, most theoretical models of the determinants of defence expenditure in the literature reach the conclusion that models that try to explain military spending should include a range of economic, political and strategic factors. Following the specification used by Wang Yu in an article from 2003, a typical specification of a general (and simple) model of defence expenditure could be written as,

$$ME = f(INCOME, PRICE, SPILL\ IN, THREAT, DOMESTIC)$$

Where military expenditure (ME) is a function of the resources that are available to fund defence expenditure (INCOME), the relative price of defence goods and services (PRICE), the military expenditures of allies (SPILL IN), the military capabilities of rivals or adversaries (THREAT) and the political and demographic factors within the country (DOMESTIC).[108]

[107] Sandler and Hartley (1995). *The Economics of Defence*; and Hartley (1991). *The Economics of Defence Policy*.

[108] Wang, Yu (2013). "Determinants of Southeast Asian Military Spending in the Post-Cold War Era: A Dynamic Panel Analysis". *Defence and Peace Economics*, 24(1), pp. 73-81.

4 Military Expenditure in the Baltic Region

Patterns of alliances and military spending shifted after the end of the Cold War. Many former members of the Warsaw Pact joined NATO, the EU or both. As the threat of a Soviet invasion disappeared Western European military spending decreased, as did the US military presence in Europe. However, Russia's military modernisation and its 2008 invasion of Georgia and 2014 annexation of Crimea have rekindled the fear of armed conflict in Eastern Europe and the Baltic Sea region.[109] As noted in Chapter 2, military expenditure is once again rising around the Baltic Sea and the US is renewing its commitment to its European NATO allies. Nonetheless, can we really be sure of what is driving military expenditure? Is it Russia's spending that is pushing the other Baltic Sea nations? How is the military spending of one Baltic Sea country affected by the spending of the others? Or is increasing military spending merely a result of rising levels of income or population changes?

Section 4.1, structures the above questions in order to empirically explore the determinants of military spending among the countries of the Baltic region. Section 4.2 defines the econometric model used in our attempt to answer these questions. Section 4.3 presents our results and Section 4.4 discusses their implications.

4.1 Research Questions and Empirical Approach

In order to explain the recent changes in military expenditure around the Baltic Sea we proposed a simple econometrical framework, which draws on the defence economics theory and the literature presented in Chapter 3. We aimed to conduct an empirical investigation of the spending patterns of the countries that border the Baltic Sea,[110] for the period 2006-15. Specifically, we wanted to answer the following questions:

- Are changes in military expenditures related to changes in the spending of perceived rivals? (i.e. Russia)

[109] For a more extensive discussion of security in the Baltic Sea region see Dalsjö, Robert (2016). *Brännpunkt Baltikum*; and Bergstrand, Bengt-Göran (2015b). *Military Expenditure Trends in the Baltic Sea States*.

[110] These countries are Sweden, Denmark, Finland, Germany, Poland, Estonia, Lithuania and Latvia. Russia also borders the Baltic Sea but is treated as an external factor in this study.

- Are changes in military expenditures related to changes in the spending of perceived allies? (i.e. other Baltic Sea nations or the US)

In order to control for other effects that are likely to have an impact on military spending, we also asked:

- Are changes in military expenditures related to changes in GDP?
- Are changes in military expenditures related to changes in population?

We are also interested in investigating whether any of these results are dependent on how the military expenditures of potential allies or rivals are expressed. Is it the rate of change in, rather than levels of, military expenditure among rivals and allies that affects the level of military spending in a given country? Furthermore, is it the level or relative prioritisation of military expenditure among allies and rivals that affects military spending in a given country? In other words, does it make a difference whether military expenditure is expressed in numbers or as a share of GDP?

A panel research design was used to examine these research questions. This design utilises the fact that we have data on multiple units, in our case the countries within the region, over time, which enables us to control for all the country-specific effects that do not change over time. Specifically, a fixed effects regression model was estimated using data from SIPRI and the IMF on military expenditure and the economies and demography of the Baltic Sea countries in 2006–15.

The focus of the empirical investigation is the Baltic Sea region *as a whole* (excluding Russia), and not on individual countries in the region. There would be valid criticism of such an approach if the group of countries under consideration were not homogenous.[111,112] However, we chose to treat the Baltic Sea region as a unit for two main reasons:

1. The region *can* be regarded as a homogenous unit of countries because they all face similar security challenges.
2. There has already been a range of studies focused on the individual countries in both the EU and NATO.[113,114]

In this way, our empirical investigation enriches the literature on determinants of military expenditure by providing an approach that is specific to the Baltic Sea

[111] Nikolaidou (2008). *Defence and Peace Economics*, pp. 273-292.
[112] Wang (2013). *Defence and Peace Economics*, pp. 73-81.
[113] Nikolaidou (2008). *Defence and Peace Economics*, pp. 273-292.
[114] Gadea, M. Dolores; Pardos, Eva and Pérez-Forniés, Claudia (2004). "A Long Run Analysis of Defence Spending in the Nato Countries (1960-99)", *Defence and Peace Economics* 15(3), pp. 231-249.

region. Little effort has previously been made to systematically examine how economic and strategic factors within the Baltic Sea region have influenced military spending patterns. Furthermore, none of the previous studies we have encountered explicitly investigate the differences between military expenditure and military prioritisation as potential signalling mechanisms between countries. Lastly, to our knowledge, this is the first time in Sweden that econometric modelling has been used to answer questions about regional military spending patterns.

It is important to note that the aim of this study is *not* to provide a full explanation of the highly complex processes that determine military spending, but rather to bring otherwise descriptive data into a theoretical setting. As J. Paul Dunne et al. pointed out in 2003, a simple model based on a general theory of the demand for military spending can provide a *basis* for an investigation of the relative importance of strategic and other social and economic factors.[115]

4.2 A Model of Military Expenditure

In order to estimate an empirical model based on the considerations presented in Chapter 3, the model and the variables to be included must be quantified and specified. We did this roughly following the specification used by Wang Yu when investigating military expenditure in South East Asia (Model 1).[116] We also specified a model that includes the rate of change in military expenditure of potential allies and rivals, with a time lag (Model 2). Unlike most previous studies, we then specified a model in which military spending as a share of GDP was used as an independent variable (Model 3).

Our econometric model for country *i* and year *t* is as follows:

$$\mathrm{LnME}_{i,t}=\beta_0+\beta_1\mathrm{LnGDP}_{i,t}+\beta_2\mathrm{LnPopulation}_{i,t}+\beta_3\mathrm{LnRussia}_t+\beta_4\mathrm{LnBaltic}$$
$$+\beta_5\mathrm{LnUSA}+\beta_6\mathrm{Time}+\tau_i+e_{i,t}$$

Where,

ME	Military Expenditure
GDP	Gross Domestic Product
Population	Population, in millions

[115] Dunne et al. (2003). *Defence and Peace Economics*, p. 447.

[116] Wang (2013). *Defence and Peace Economics*, pp. 73-81. Dunne and Perlo-Freeman used a similar approach when investigating military spending in developing countries, Dunne, J. Paul and Perlo-Freeman, Sam (2003). "The Demand for Military Spending in Developing Countries: A Dynamic Panel Analysis". *Defence and Peace Economics* 14(6), pp. 461-474.

Russia	Russian military expenditure (Model 1), change in Russian military expenditure in year *t-1* (Model 2) or Russian military expenditure as a share of GDP (Model 3)
Baltic	Total military expenditure in the rest of the Baltic region, excluding country *i* and Russia (Model 1), change in military expenditure in the rest of the Baltic region in year *t-1*, excluding country *i* and Russia (Model 2) or the sum of Baltic military expenditure as a share of the sum of GDP, excluding country *i* and Russia (Model 3)
US	US military expenditure (Model 1), change in US military expenditure in year *t-1* (Model 2) or US military expenditure as a share of GDP (Model 3)

Furthermore, *Ln* denotes the natural logarithm, *Time* is a common linear time trend, τ is the country-specific fixed effect and e is a disturbance term. Military expenditure and GDP in all models are expressed in constant 2014 USD million.

The variables included were chosen to represent a simple demand model based on the neoclassical framework of maximising a social welfare function given security and budget constraint. Data on military spending is from SIPRI,[117] while data on economic indicators and population is from the IMF World Economic Outlook.[118]

The level of GDP is included in order to capture a relationship between income and military expenditure, as GDP is *one* measure of the resources that are available to fund military expenditure. Such a relationship could, however, be influenced by diminishing returns on investments in defence, such as when a country reaches a certain degree of security, increases in income leave defence expenditure relatively unchanged.[119] Population size is included in the model in order to capture a potential scale effect from the size of a country on military expenditure.[120]

Military expenditure by perceived rivals or adversaries is a factor that could potentially influence defence spending in the region. Russian military spending and military activity in the Baltic Sea could constitute a serious security concern for the remaining Baltic Sea nations. Political perceptions of regional security around the Baltic Sea are therefore not likely to be unaffected by Russian military spending.

[117] SIPRI (2016b). *Military Expenditure Database*. Accessed 2016-08-03.
[118] IMF (2015). *World Economic Outlook*. Accessed 2016-06-13.
[119] Dunne et al. (2003). "The Demand for Military Spending in the Peripheral Economies of Europe". *Defence and Peace Economics* 14(6), p. 447.
[120] For a discussion of the effects of population see Wang (2013). *Defence and Peace Economics*, pp. 73-81; or Dunne et al. (2003). *Defence and Peace Economics*, p. 447.

Alliance effects and the possibility of free-riding within the region are captured by the military expenditures of other countries, excluding Russia. Relations with other countries that are perceived to be allies are factors that could have an influential effect on the defence expenditure of a country. The Baltic region comprises countries that are members of NATO, the EU or both. Even where a formal alliance does not exist, *informal alliances*, such as the Swedish declaration of solidarity in 2009, could have an impact. The military spending of other Baltic states is therefore included. US military spending is included as the US is by far the strongest NATO member.

In line with most previous empirical research on the topic, information on the relative prices of defence goods and services are dropped from the equation, as there is virtually no information on such prices available.[121]

4.3 Panel Data Estimates

The results of our fixed effects models of military expenditure are shown in Table 6, below. Three separate models are presented. Model 1 includes the level of *military expenditure* in Russia, the Baltic region and the US. Model 2 includes the changes (first differences) in military expenditure over the previous time period. Model 3 includes *military prioritisation*, that is, military expenditure in relation to GDP.

The table provides estimates of the impact of each variable on military expenditure in the region, when all the other variables included in the models are held constant. Since the models were estimated using country fixed effects, the time invariant characteristics of each country are also controlled for. The estimates can thus be interpreted as changes *within* each country (in relation to the other countries), rather than changes *between* countries in the sample.

Since all the variables except time and constant are expressed as natural logarithms, the coefficients in Table 6 can be interpreted as *elasticities*. This means that the coefficient answers the question: *If we change the independent variable by 1 percent, by how many percent can we expect military expenditure in the region to change?* Asterisks in the table indicate a statistically significant relationship at different levels of confidence. Basically, a statistically significant result is not probable to be obtained just by chance. However, statistical significance does not tell us anything about the relevance or causal nature of a result. A statistically significant relationship must therefore be interpreted in its theoretical context as well as in the light of the observed reality of the region in question.

[121] The implication of this is that most of the estimated equations in the literature are not really demand functions, since they do not include price as an explanatory variable. See Dunne et al. (2003) or Wang (2013) for a discussion.

Table 6: Regression Results for Fixed Effects Model: Dependent variable (ln) military expenditure, 2006-15.

Variable	*Model 1*	*Model 2*	*Model 3*
ln GDP	1.644**	1,973**	1.859**
ln Population	2.567*	2,560*	2.529*
ln Russian ME	0.283		
ln Baltic ME	-0.0556		
ln US ME	-0.0718		
Last year's change in ln Russian ME		0.639**	
Last year's change in ln Baltic ME		-0.857**	
Last year's change in ln US ME		0.930	
ln Russian military prioritisation			1.729***
ln Baltic military prioritisation			-1.002*
ln US military prioritisation			0.348
Time	-0.0390	-0.007	-0.114***
Constant	59.62	-8.261	211.978***
R^2(adj.)	0.564	0.587	0.632
Observations	80	80	80

* p<0.05, ** p<0.01, *** p<0.001. Robust standard errors are used.

What does the data tell us about military expenditure in the Baltic region in the period 2006-15? The impact of GDP on military expenditure in the region is positive and statistically significant in all models. When GDP rises so does military expenditure. A 1 per cent increase in GDP is associated with an increase in military expenditure of around 1.6 per cent (in Model 1). In economic terms, defence can

be described as a normal good during the period studied. Growth in population is also associated with increases in military expenditure, signalling a potential scale effect from population size.

The amounts of military expenditure by Russia, other countries in the Baltic region and the USA were not significant in Model 1. This implies that the level of military spending by Russia, the other Baltic nations and the US had no impact on the military spending by the countries in the region. However, this is only the case when military expenditure is expressed in absolute levels.

If instead we estimate the impact of changes in military expenditure over the previous time period (Model 2), or the impact of military expenditure as a share of GDP on military expenditure (Model 3), the results change.

Model 2 shows that an increase in the *rate of change* of Russian military expenditure in the *previous year* is positively and significantly associated with increases in military expenditure in the region. A 1 per cent increase in the percentage change in Russian military expenditure on the previous year is on average followed by a 0.64 per cent increase in military expenditure, all other things being equal. Furthermore, the rate of change of military expenditure for other countries in the Baltic region is *negatively* associated with military expenditure in a given country. This means that a 1 per cent increase in the percentage change in military expenditure in other Baltic Sea countries is followed by a 0.86 per cent decrease in the military expenditure of a given country.

Model 3 shows that an increase in Russian military prioritisation is positively and significantly associated with increases in military expenditure in the region. A 1 per cent increase in Russian military expenditure as a share of GDP is on average followed by a 1.7 per cent increase in military expenditure, all other things being equal. Furthermore, the military prioritisation of other countries in the Baltic region is negatively associated with military expenditure in a given country. A 1 per cent increase in the military prioritisation of other countries in the Baltic region is followed by a 1 per cent decrease in the military expenditure of a given country. The effects of changes in US military expenditure and its military burden are statistically insignificant in all three models.

Our results indicate that military expenditure is not driven by the levels of military expenditure of other nations in absolute terms. Instead, the data suggests that it is the prioritisation and the rate of change in military expenditure that has worked as a signalling mechanism between countries, and that there has been a time lag in how countries responded to these signals. The data also suggests that there has been free-riding within the region in response to the military expenditure of other Baltic Sea nations, as well as a military build-up as a result of increased Russian military priorities.

4.4 Discussion of Findings

This study used an econometric framework to identify the determinants of military spending among countries in the Baltic region during the period 2006-15. Using a fixed effects model, we found evidence to suggest that that there has been free-riding in the region as well as a military build-up as a result of increased Russian military priorities. Interestingly, the signalling mechanism between countries does not appear to be the level of military expenditure. Instead, the rate of change in military expenditures seems to work as a signalling mechanism, and there is a time lag in how countries respond to these signals. Our findings also suggest that how countries prioritise military expenditure in relation to available economic resources sends a stronger signal than the level of military spending. In addition, we found that changes in GDP and population size were statistically significant determinants of defence expenditure in the region during the period studied.

The interpretation of our results depends on how we look at the region. Who is regarded as an ally? Who as a potential adversary? We made several assumptions that strongly influence the conclusions. As always, it is important not to confuse correlation with causation. How can we be absolutely certain that Russian military priorities really *cause* countries in the Baltic region to increase their military expenditure? The short answer is that we cannot, at least not using the methodology presented above. It could be the case that some variable has been omitted that influences the military spending of *both* Russia and the Baltic Sea states. Concerns could also be raised about the validity of the results over time. How dependent are our results on the time period being studied?

It would be naive to claim that the highly complex processes that determine military spending could be reduced to the simple equations presented in this study. However, models are necessary simplifications of such complexities and can provide a framework for thought. Furthermore, our simple model has produced some interesting results that do not appear to be inconsistent with observable security issues in the Baltic Sea region.

5 Concluding Remarks

In the introduction of this report we asked what the global trends in military expenditure looked like, whether or not economic theory could help us understand what drives military expenditure, and what these driving forces look like in the Baltic Sea region.

The report has shown that patterns of global military expenditure have developed unevenly in the past decade. Western countries have decreased their military spending while countries in most other regions, especially the emerging economies, have increased theirs. This change is not enough to shift the global power balance, but regional security dynamics have changed.

In Europe, Russia has spent vast amounts on modernising its military arsenal. Eastern European countries have increased their military spending while in Western Europe countries have still to reverse their decades-long defence cuts. In the Americas, the US remains the world's foremost military power and largest spender on defence by a huge margin. Brazil is South America's largest military spender, but the country is currently struggling with economic and political problems. In Asia, China has modernised its military at a rapid pace, triggering rising security concerns in the region. India and South Korea are also modernising their armed forces, while Japan has revised self-imposed limits on its armed forces. Saudi Arabia is the largest spender on defence in the Middle East. The oil-rich country's intervention in neighbouring Yemen is part of its ongoing rivalry with Iran. However, it is non-state actors that currently pose the most serious threat to regional security. Daesh is currently being pushed back in Iraq, Syria and Libya, but even its defeat will be no guarantee of peace in these war-torn countries.

Eastern Europe has re-emerged as a conflict region. Russian aggression against Georgia and Ukraine has rekindled fears of a possible military conflict around the Baltic Sea. We conducted an econometric analysis to investigate whether Russia's military build-up has affected the other countries in the region. Our findings suggest that increases in the rate of change in Russian military spending and Russian military prioritisation can help explain the increases in military expenditure among the countries of the Baltic region. Economic growth and population change can also help to explain patterns of military spending in the region over the past decade. The results also indicate that increases in the rate of change in military spending, as well as the military priorities, of neighbouring countries in the region other than Russia seem to be negatively associated with military prioritisation in a given country. This can be interpreted as if the countries in the region to some extent regard investment in defence as a public good. While interpreting the causality of these findings with caution, they are nonetheless statistically significant and can help to deepen our understanding of the factors behind military spending in the Baltic Sea region. These results have also shown

that economic theory, through empirical analysis, can help us understand patterns of military expenditure.

Our findings should be of interest to Ministries of Defence and Foreign Affairs. The methodology employed should be of interest to the defence research community. Our analysis of global spending patterns and the Baltic Sea region should also be of interest to various armed forces. The findings raise some important questions that could become the subject of further research. Such research could expand our findings to other regions and other time periods, and try to incorporate the signalling mechanism suggested in our findings. It might also be possible to test alternative variables for the perceived threat from rivals or spill-in effects from alliances. Furthermore, the dynamic elements of the processes that determine military expenditure, such as the time needed to respond to an increased threat, as well as the structural components of the responses to military spending by rivals and allies (i.e. the game theory approach), could be developed further.

6 References

Literature

Amara, Jomana (2008). "NATO Defence Expenditure: Common Goals or Diverging Interests? A Structural Analysis". *Defence and Peace Economics* 19(6), pp. 449-469.

Atarodi, Alexander; Dalberg, Eva; Hellström, Jerker; Höstbeck, Lars and Rydqvist, John (2010). *India: A Defence and Security Primer*. FOI-R--2983--SE, May.

Berg, Ida Helene and Nyhus Kvalvik, Sverre (2015). *Makroøkonomiske trender 2015 – utvikling i norsk og internasjonal forsvarsøkonomi*. FFI-rapport 2015/00322.

Bergenwall, Samuel (2015). *Indiens växande ekonomiska och strategiska betydelse*. FOI Memo 5339.

Bergenwall, Samuel and Eriksson, Mikael (2014). *Mellanöstern och Nordafrika i ett 5-10-årsperspektiv*. FOI-R--4103--SE, December.

Bergstrand, Bengt-Göran (2015a). *NATO Military Expenditures: Trends 2010-2015 with Projections for 2016-2020*. FOI-R--4223--SE, December.

Bergstrand, Bengt-Göran (2015b). *Military Expenditure Trends in the Baltic Sea States*. FOI Memo 5544.

Brzoska, Michael (1995). "World Military Expenditures" in Hartley, Keith and Sandler, Todd. *Handbook of Defense Economics*. Volume 1, Oxford: North-Holland, pp. 45–67.

Bäckström, Peter and Olsson, Per (2016). *Försvarsekonomi i fokus: Tyskland*. FOI Memo 5610.

Dalsjö, Robert (2016). *Brännpunkt Baltikum*. FOI-R--4278--SE, June.

Dalsjö, Robert; Korkmaz, Kaan and Persson, Gudrun (2015). *Örnen, Björnen och Draken: Militärt tänkande i tre stormakter*. FOI-R--4103--SE, September.

Dunne, J. Paul; Nikolaidu, Eftychia and Mylonidis, Nikolaos (2003). "The Demand for Military Spending in the Peripheral Economies of Europe". *Defence and Peace Economics* 14(6), pp. 447-460.

Dunne. J. Paul and Perlo-Freeman, Sam. (2003). "The Demand for Military Spending in Developing Countries: A Dynamic Panel Analysis". *Defence and Peace Economics* 14(6), pp. 461-474.

Forsström, Anna; Sundberg, Anna and Winnerstig, Mike (2013). *Europas säkerhet och försvar i en ny tid*. FOI-R--3647--SE, March.

Försvarsdepartementet (2015). *Regeringens proposition 2014/15:109. Försvarspolitisk inriktning: Sveriges försvar 2016-2020*.

Gadea, M. Dolores; Pardos, Eva and Pérez-Forniés, Claudia (2004). "A Long Run Analysis of Defence Spending in the NATO Countries (1960-99)". *Defence and Peace Economics* 15(3), pp. 231-249.

Global Counsel (2015). *BREXIT: the Impact on the UK and the EU*. June 2015.

Griffin, Larry J.; Wallace, Michael and Devine, Joel A. (1982). "The Political Economy of Military Spending: Evidence from the United States". *Cambridge Journal of Economics* 6, pp. 1-14.

Hartley, Keith (1991). *The Economics of Defence Policy*. First edition, UK. Brasseys.

Hassan-Yari, Houchang (2016). "Middle East Warfighting Capabilities in 2025" in Holmquist, Erika and Rydqvist, John, eds. *The Future of Regional Security in the Middle East: Expert Perspectives on Coming Developments*. FOI-R--4251--SE, April, pp. 100-106.

Heginbotham, Eric; Nixon, Michael; Morgan, Forest E.; Heim, Jacob L.; Hagen, Jeff; Li, Sheng; Engstrom, Jeffrey; Libicki, Martin C.; DeLuca, Paul; Shlapak, David A.; Frelinger, David R.; Laird, Burgess; Brady, Kyle and Morris, Lyle J. (2015) *The U.S.-China Military Scorecard: Forces, Geography and the Evolving Balance of Power 1996-2017*. RAND Report.

IISS (2016). *The Military Balance*. 116:1.

Kollias, Christos (2008). "A Preliminary Investigation of the Burden Sharing Aspect of a European Union Common Defence Policy". *Defence and Peace Economics*, 19(4), pp. 253-263.

Korkmaz, Kaan (2014). *Försvarspolitik och försvarsmodernisering i Turkiet*. FOI Memo 4993.

Korkmaz, Kaan and Rydqvist, John (2012). *The Republic of Korea: A Defence and Security Primer*. FOI-R--3427--SE, April.

Li, Chien-pin (1997). "Fear, Greed, or Garage Sale? The Analysis of Military Expenditure in East Asia". *The Pacific Review*, 10(2), pp. 274-288.

Lins de Albuquerque, Adriana (2016), "Analysing Security in the Middle East from a Regional Perspective" in Holmquist, Erika and Rydqvist, John, eds. *The Future of Regional Security in the Middle East: Expert Perspectives on Coming Developments*. FOI-R--4251--SE, April, pp. 14-25.

Malmlöf, Tomas; Roffey, Roger and Vendil Pallin, Carolina (2013) "The Defence Industry" in Hedenskog, Jakob and Vendil Pallin, Carolina, eds. *Russian Military Capability in a Ten-Year Perspective*. FOI-R--3747--SE, December, pp. 121-141.

Marrone, Alessandro; De France, Olivier and Fattibene, Daniele, eds. (2016). *Defence Budgets and Cooperation in Europe: Developments, Trends and Drivers*. EDA.

Nikolaidou, Eftychia (2008). "The Demand for Military Expenditure: Evidence from the EU15 (1961-2005)". *Defence and Peace Economics*, 19(4), pp. 273-292.

Nordlund, Peter and Åkerström, Janne (2012). *Försvarsutgifter i budgetkrisens spår – en försvarsekonomisk omvärldsanalys*. FOI-R--3508--SE, October.

Oldberg, Ingmar (2007). *The Shanghai Cooperation Organisation: Powerhouse or Paper Tiger*. FOI-R--2301--SE, June.

Olson, Mancur Jr. and Zeckhauser, Richard (1966). "An Economic Theory of Alliances". *Review of Economics & Statistics* 48(3), pp. 266-279.

Oxenstierna, Susanne (2013). "Defence Spending" in Hedenskog, Jakob and Vendil Pallin, Carolina, eds. *Russian Military Capability in a Ten-Year Perspective*. FOI-R--3747--SE, December, pp. 103-120.

Oxenstierna, Susanne (2014). *The Russian Economy: Can Growth be Restored within the Economic System?* FOI-R--3876--SE, May.

Oxenstierna, Susanne and Olsson, Per (2015). *The Economic Sanctions against Russia: Impact and Prospects of Success*. FOI-R--4097--SE, June.

Perlo-Freeman, Sam; Fleurant, Aude; Wezeman, Pieter and Wezeman, Siemon (2016a). *SIPRI Fact Sheet: Trends in International Arms Transfers, 2015.* February 2016.

Perlo-Freeman, Sam; Fleurant, Aude; Wezeman, Pieter and Wezeman, Siemon (2016b). *SIPRI Fact Sheet: Trends in World Military Expenditure, 2015*. April 2016.

Richardson, Lewis F. (1960). *Arms and Insecurity: A Mathematical Study of Causes and Origins of War*. Pittsburgh: Boxwood Press.

Rossbach, Niklas H. (2015). *Amerikanska prioriteringar i Fjärran Östern: USA:s säkerhetspolitik och allianser i Asien och Stillhavsområdet*. FOI-R--4091--SE, June.

Rydqvist, John; Holmquist, Erika; Neretnieks, Karlis and Bergstrand, Bengt-Göran (2014). *Västra Stilla havet: Säkerhetspolitiska trender på tio års sikt*. FOI-R--3907--SE, June.

Sandler, Todd and Hartley, Keith (1995). *The Economics of Defence*. Cambridge: Cambridge University Press.

Skogstad, Karl (2016). “Defence Budgets in the Post-Cold War Era: A Spatial Econometrics Approach”. *Defence and Peace Economics* 27(3), pp. 323-352.

Smith, Ron (1995). “The Demand for Military Expenditure” in Sandler, Todd and Hartley, Keith, eds. (1995) *Handbook of Defence Economics*. Volume 1, Oxford: North-Holland.

Wang, Yu (2013). “Determinants of Southeast Asian Military Spending in the Post-Cold War Era: A Dynamic Panel Analysis”. *Defence and Peace Economics*, 24(1), pp. 73-81.

Online

BBC News (2016). “Turkey v Syria’s Kurds v Islamic State”, 19 February 2016, http://www.bbc.com/news/world-middle-east-33690060. Accessed 2016-08-11.

Dagens Nyheter (2016). “Världen stoppar hellre flyktingar än kriget”, 3 September 2016, http://www.dn.se/nyheter/varlden/ingmar-neveus-varlden-stoppar-hellre-flyktingarna-an-kriget/. Accessed 2016-09-05.

NATO (2014). “Wales Summit Declaration”, Press release 120, 5 September 2014, http://www.nato.int/cps/en/natohq/official_texts_112964.htm. Accessed 2016-06-07.

OECD (2016). “Israel Economic Forecast”, http://www.oecd.org/economy/israel-economic-forecast-summary.htm. Accessed 2016-08-12.

The Guardian (2016). “NATO Countries Begin Largest War Game in Eastern Europe since Cold War”, 6 June 2016, https://www.theguardian.com/world/2016/jun/06/nato-launches-largest-war-game-in-eastern-europe-since-cold-war-anaconda-2016. Accessed 2016-08-03.

The World Bank (2016). “Overview: Turkey”, 7 April 2016, http://www.worldbank.org/en/country/turkey/overview. Accessed 2016-08-15.

Wall Street Journal (2016). “NATO Allies Preparing to Put Four Battalions at Eastern Border with Russia”, 29 April 2016, http://www.wsj.com/articles/nato-allies-preparing-to-put-four-battalions-at-eastern-border-with-russia-1461943315. Accessed 2016-08-03.

Washington Post (2016). “Colombian government, rebels reach a major milestone in peace talks”, 22 June 2016, https://www.washingtonpost.com/world/the_americas/colombian-government-rebels-reach-a-major-milestone-in-peace-talks/2016/06/22/f95bedb6-3886-11e6-af02-1df55f0c77ff_story.html. Accessed 2016-08-03.

Data

IMF Economic Outlook (2015). *World Economic Outlook*. https://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx. Accessed: 2016-06-13.

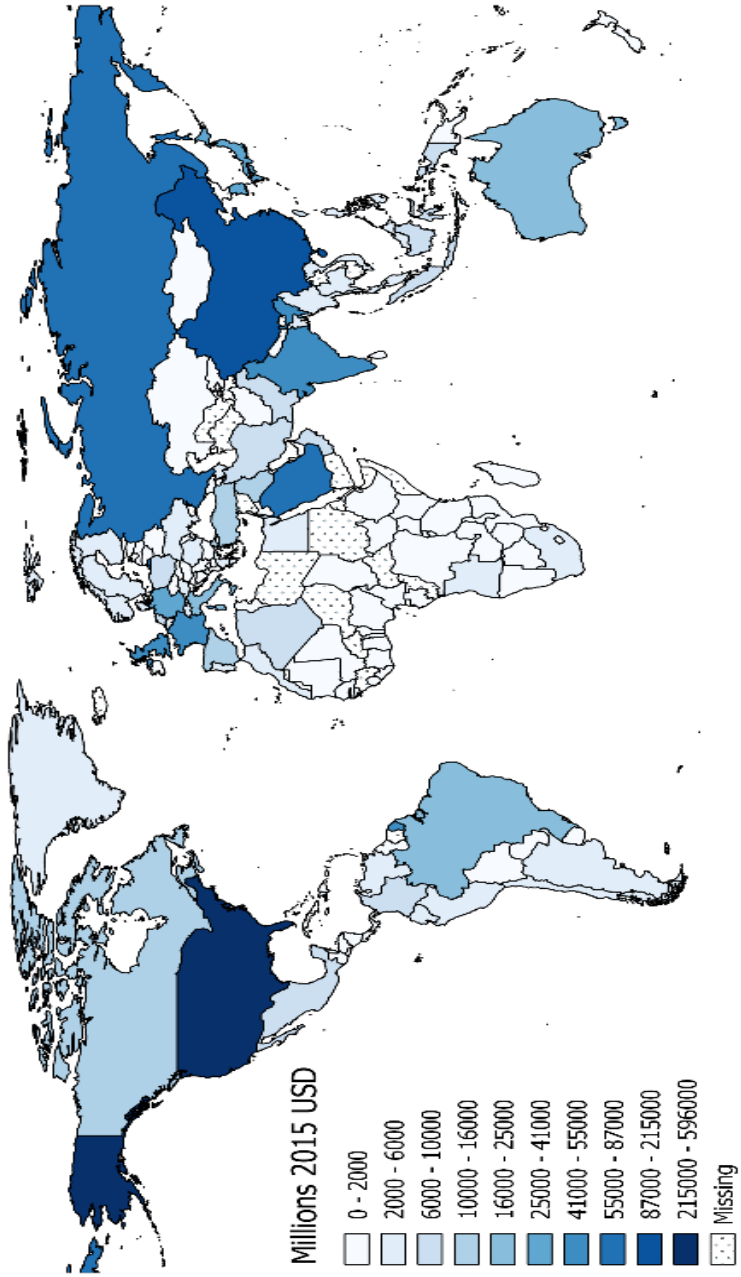
SIPRI (2016a). *Sources and Methods*, https://www.sipri.org/databases/milex/sources-and-methods. Accessed 2016-04-06.

SIPRI (2016b). *Military Expenditure Database*, https://www.sipri.org/databases/milex. Accessed 2016-04-06.

SIPRI (2016c). *Arms Transfer Database*, https://www.sipri.org/databases/armstransfers. Accessed 2016-08-03.

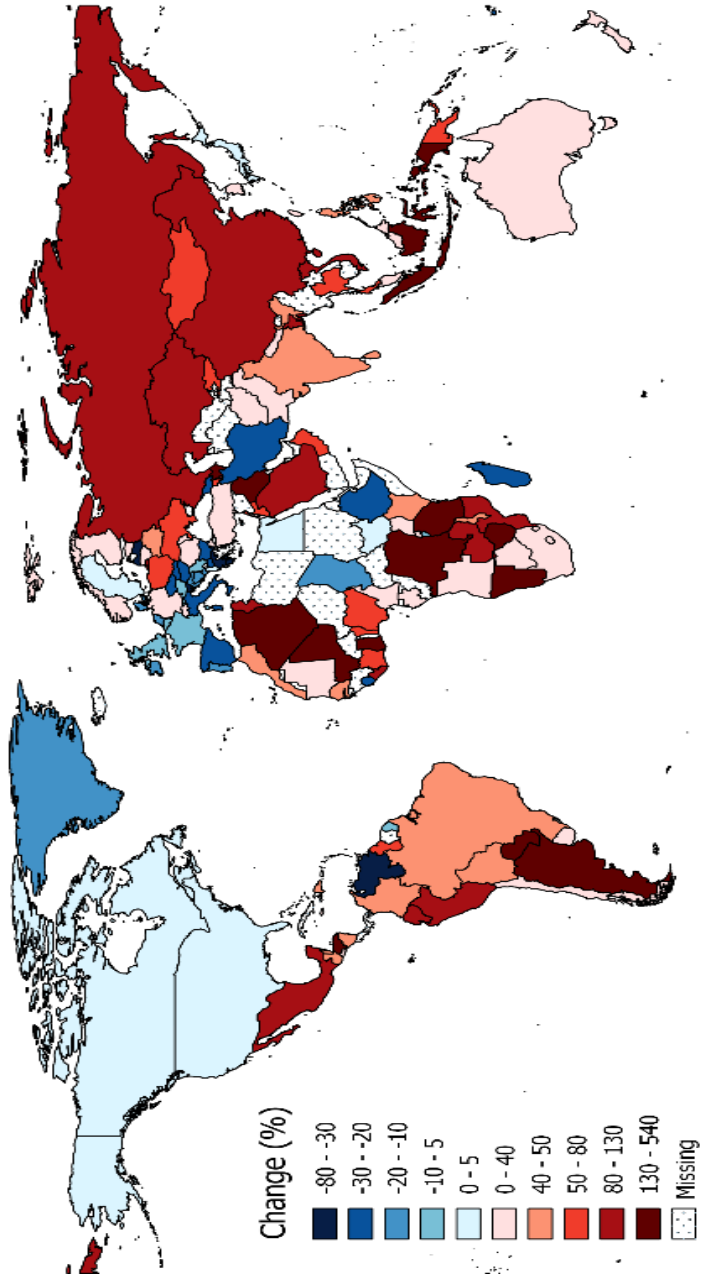
Appendix A

Global Military Expenditure, 2015 (Current Prices)



Appendix B

Global Military Expenditure, 2006-15 (2014 Constant Prices)



This report is the first in a biennial series called Defence Economic Outlook (DEO) which is carried out through the project Defence Economic Studies at the request of the Swedish Ministry of Defence. Each DEO report will contain an overview of global military expenditure as well as a special topic. This year's topic is the driving forces behind military expenditure by the countries around the Baltic Sea.

FOI

ISSN1650-1942

www.foi.se