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Guns, Butter and Growth: the effect of military spending on social spending and economic development in small allied countries

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Contents

Abstract

This paper analyses the consequences of an increase in military spending on social spending and its effect on economic growth. Is there a trade-off between expenditures on defence and social welfare programs for the relatively small countries which are members of NATO? In order to answer this question four countries will be analysed, specifically Denmark, Poland, Turkey, and Norway. To obtain sophisticated results Structural Vector Autoregression was used. The government's primary income sources were taken into account in order to capture the indirect relationships between the variables over time. Each country's model included the following variables - GDP, military spending, money supply, tax revenue, debt and social spending. For Denmark and Norway which allocate a significant share of government income on social welfare programs, no trade-off was found. The outcomes for Poland and Turkey which have a lower level of social spending, showed ambiguous results. Evidence of the trade-off was found for Turkey, but not for Poland. Furthermore, the results suggested that an increase in military spending firstly caused the GDP of Denmark, Norway and Turkey, but soon exceeded the long-term steady value. On the contrary, Poland experienced slow, consistent growth over time.

Chapter 1

Introduction

1.1 Government's goals and obligations

National security is commonly treated as one of the most crucial services which countries provide to their citizens. Indeed, for many years one of the main roles of the state has been to protect the freedom and rights of its inhabitants (Locke, 1779). However, in modern society, governments need to ensure that military spending does not come at the expense of education, health, elderly people support and other social spending. In order to be successful and supported, authorities are obliged to spend additional funds on the care for the unemployed and elderly people, individuals with disabilities and many more (Eurostat, 2022). Modern European countries have to make those expenditures to keep high levels of citizens' approval and life satisfaction.

Moreover, the other crucial reason to invest in social spending is that it can positively affect the economy (Furceri and Zdzienicka, 2012). Even though this research found that the effect of increased social expenditures on GDP is only about 0.1%, at the aggregate level this represents millions of euros. It is worth noting that there are several papers which show that more developed European countries tend to have higher expenditures on social benefits (Pampel and Williamson, 1988; Im et al., 2011).

On the other hand, increased military spending has an ambiguous effect on the economy, according to scholars. Some of them suggest that due to prioritising expenditures on defence, the government reduces investments in the infrastructure and in this way slows down economic growth (Rooney et al., 2021). Nevertheless, other researchers make different conclusions. It is claimed that additional spending in the military sphere creates additional jobs, which increases the aggregate domestic demand and in the following way it supports economic development (Heo and Bohte, 2012).

1.2 "Guns-versus-butter"

Each country's budget is constrained by the government income - money supply, tax revenues, debt or other income sources. Practically, it means that in order to increase spending in specific areas, it is essential to either reduce other expenditures, get additional resources or, most commonly, do a combination of both. Those financial limitations have been understood by the rulers of countries for a long time. Furthermore, they recognized that sacrificing social welfare programs could be a sufficient method to enhance military development.

One of the examples is France, during its colonial campaigns in North Africa. According to Thomas (2005), military expeditions to conquer and occupy new territories put a big burden on the budget. Therefore, to finance those rising costs, the French government decided to reduce expenditures on social welfare programs. The spending on the following social initiatives was significantly reduced - Public Health, Education, Poverty Alleviation Programs and others.

The most famous example of substituting social benefits with military spending occurred in the USA in 1916 (Fishback, 2008). At that time, Congress decided to sponsor the excessive military spending, which occurred because America entered World War I, with a budget which was previously allocated to agriculture. In the media, this situation was framed as the "guns-versus-butter" trade-off, which gave rise to this term in economic literature. Moreover, this Congress decision made a big social resonance in society, which provoked the start of the history of investigations of this trade-off.

1.3 Geopolitical relevance

Understanding the costs of increased military spending is essential for any country since in this way it is possible to make the most efficient and considered decisions. Nowadays, developed countries, which want to preserve security and do not have to sacrifice too much to develop their defence system, prefer to join military alliances rather than stay alone in conflicts. This trend can be observed through the NATO expansion tendencies (NATO, 2023) over the past 70 years. There were only 12 founding countries in 1949, but the size of the alliance nearly tripled over the years - having 31 members by 2023.

Moreover, given the current geopolitical situation, the significance of security alliances is exceptionally high, as tensions between the global powers are rising rapidly. According to Glaser (1997), relatively small countries are seeking the "security umbrella" in the military unions, expecting protection from the bigger global geopolitical players like the

USA, Germany or the UK (Odehnal and Neubauer, 2020). Will joining an alliance save them from experiencing the "guns-versus-butter" trade-off by outsourcing the defence costs to other allies, or this phenomenon still emerges? The answer to this question can serve as valuable support in creating a security strategy for small countries. Therefore, the research question of this paper is following:

Are there trade-offs between Military Spendings and Social Spendings, and between Military Spendings and Economic Growth in the small allied countries?

1.4 Organisation and structure

To answer the research question, four countries will be used. In particular, two of the selected countries prioritize allocating a considerable portion of their budget towards social spending, while the remaining two allocate a significantly smaller share to it. Since it is expected that the first two countries will try to protect social spending as much as possible, and the other two will not - the first hypothesis will be as follows:

Small allied countries which allocate a relatively big share of the government budget on social benefits do not experience the "guns-versus-butter" trade-off, while the ones which allocate a small share experience this trade-off.

Testing this hypothesis will allow us to understand if the military/social spending trade-off generally exists for small allied countries, and identify for which type is it the most significant. Moreover, the relationships between expenditures on defence and economic development will be researched. It will be tested if concentration on defence could indeed shift the focus away from development. Therefore, the second hypothesis is the following:

There is a negative effect of the increased military spending on the GDP of the country.

In order to answer the question and test both hypotheses firstly literature review will be presented and discussed. It will provide a comprehensive overview of the previous research and findings on this topic, as well as explain how the present paper contributes to the existing literature. After this, the Methodological approach will be shown and explained in detail. The assumptions and limitations for each method will be discussed, as well as clarification of why those were chosen for this analysis. The following chapter is the Empirical Model with a discussion of which data is used for the research. Additionally, in this part, the necessary transformations and descriptive statistics are presented. Furthermore, the details of the model specification will be discussed. Finally, at the end

of the research, the Results and Conclusions chapters are presented. The hypotheses will be carefully examined and the answer to the research question will be given.

Chapter 2

Literature overview

2.1 Early studies of the topic

The research history of "guns-versus-butter" is long and many scholars have made an attempt to assess whether there is a trade-off between military spending and social spending. One of the first attempts was performed by Russett (1969). In this paper, the author talked about the increasing defence expenditure and its effect on the different segments of the economy - personal consumption, trade, investments and others. As a result, it was found that personal consumption contributed the most to increased spendings on the military, therefore it was claimed that indeed guns come at the expense of butter. Nevertheless, other authors continued researching this trade-off, to find the explicit connection between the government funds allocated towards defence and the ones spent on social benefits. One of the other early works in this field was the paper by Kelleher et al. (1980) where authors examined the "guns/butter" trade-offs for the USA, France, Germany and the United Kingdom in the period from the 1920th to the 1970th, using linear regression. They came to the conclusion that there is no connection between the two expenditures - only the analysis of the American data suggested a short-term negative association. The same researchers conducted a new analysis in 1983, where they reconfirmed the previous results for the same set of countries, however using a more convincing regression model which included a larger number of variables (Domke et al., 1983). Similar results were found by Russett (1982), which used data from America in the post-1945 period. The author stated that it is difficult to establish empirically the direct connections between two types of spendings, which was generally in line with the findings made earlier. However, all of them investigated the trade-off only for big countries, without taking into account whether the country is in a military alliance or not.

The first research where this correction was made is the paper by Palmer (1990). The researcher tried to find if the effect of membership in a military alliance by small coun-

tries affects their volume of security spending, and if the increase in those expenditures does not influence the cut of social benefits. He used data from the following countries - Belgium, Denmark, the Netherlands and Norway, and applied linear regression. From the results, the author drew out the conclusion that the "guns-versus-butter" trade-off exists for small allied countries.

There were several issues with the research designs of the papers at that time, and those problems were addressed in the paper by Huang and Mintz (1992). The main complications were wrong concepts, excluding indirect and disaggregated effects. An additional significant problem was that scholars didn't use dynamic and longitudinal research designs for their studies and therefore, the results were not robust and trustworthy. Above mentioned authors earlier made their own investigation regarding the "guns-butter" trade-off, where they explored the indirect effects of defence spending on social benefits. Additionally, they improved the empirical design by using several lags of variables in the model. Notably, they concluded that there is an indirect trade-off, which happens over time. They state that military spending crowds out investment, which slows down economic growth, and it influences the reduction of social spending (Alex et al., 1991).

This is a crucial finding for this research, as it suggests the existence of a non-direct trade-off, which requires including other parameters in the research. Another important contribution is that the paper by Alex et al. (1991) established the negative association between military spendings and economic development. This analysis contributes to the finding by investigating the effect of defence expenditures and economic growth, assuming the existence of direct and indirect connections.

2.2 Indirect effect and new methods

The idea of the possible importance of indirect effect in exploring the "guns/butter" trade-off was developed further by Heo and Bohte (2012), who included tax revenues, debts and unemployment in their research. As a result, they found a positive relationship between spendings on military and economic growth. Heo and Bohte (2012) argue that growth in defence spending implies an increase in the number of defence orders and as a result larger demand for the working population. Therefore, the positive association can be explained by the Keynesian prediction that an increase in aggregate demand and employment positively influences economic growth. This finding is opposite to what was found earlier in the research by Alex et al. (1991), which means that there is no consensus in the current literature and further investigations are required. Another result of their research was finding clear evidence that debt, tax revenues, money supply, economic growth and military/social spendings are all interrelated.

Moreover, it is known that different countries prefer to use different ways to sustain their budget: some of them take on more debts, and some of them increase taxes. Therefore, Carter et al. (2021) pointed out the fact that it is possible that the way a country prefers to finance its budget can directly impact the existence and magnitude of the "guns/butter" trade-off. The assumption that the sources of government income play a role in the trade-off between military spending and social spending was confirmed by Oatley (2015). The author investigated the effect of the defence build-up in the USA on economic development, taking into account tax revenues, debts and money supply. Surprisingly, it was found that only deficit-financed military build-ups lead to growth, while the build-ups financed with tax revenues did not show similar results. These results suggest that the trade-offs can heavily depend on the sources of governmental income.

Furthermore, this idea was developed in the paper by Carter et al. (2021), where authors included tax revenues, debt and money supply in their research. They divided American history into different periods, depending on the priorities regarding the source of the government income, as well as the attitude towards social expenditures. Their findings show that the "guns/butter" trade-off emerges only when the country tries to keep taxes or debt low, and positive relations between the military and social spendings otherwise. On the other hand, the influence of defence spending on economic growth appears to be non-linear, which means that it radically varies over time. It implies that according to Carter et al. (2021) right after an increase in military expenditures, GDP drops significantly, but after 6 months it starts growing again, and shortly after the country experiences significant growth.

2.3 Contribution to current literature

This analysis contributes to the current literature about the "guns/butter" trade-off in several ways. Firstly, by concentrating on small allied countries, the findings of social/military spending trade-off made by Palmer (1990) are reconsidered using the time-series data and having a more advanced empirical approach. This can give essential and dynamic insights into the trade-off phenomenon for those countries. Trustworthy results will be generated, which further can be used for policymaking purposes. Moreover, in the paper by Palmer (1990), the same regression was used for all the studied countries to research the military/social spending trade-off, without considering the difference between those countries. However, in this analysis separate models are created, taking into account how each country prefers to finance its spendings and if it prioritises social expenditures.

Additionally, the effect of an increase in military spending on the economic growth of small NATO countries is going to be researched, which was not performed in the previous studies. Secondly, this research will contribute to the current literature, which uses a time-series approach, by exploring the long-term effect of the increased military expenditures. Current studies concentrate on finding the existence of the short-term trade-offs (Oatley, 2015; Carter et al., 2021), however, new insights will be provided by exploring the long-term effect of the sudden growth in military spending on social spending, and on economic development - which was not done previously.

This analysis extends the literature by including the study of the trade-off between military and social spending in countries which restored independence relatively recently compared to long-standing NATO members. This research introduces a comparative analysis, and extends our understanding of the trade-off dynamics, by guiding policymakers in balancing national security concerns, and societal and economic development.

Chapter 3

Methodology

Several methods can be used in order to identify the time-varying effect of the change in one variable on the other ones. The previous papers mostly used different types of linear regressions to study the "guns-versus-butter" trade-off (Russett, 1969; Kelleher et al., 1980; Domke et al., 1983; Palmer, 1990), however, they were heavily criticised and results were not trustworthy (Huang and Mintz, 1992). It is essential to account for the time dependency of variables in order to establish a "guns/butter" trade-off. Another important aspect which was found by Heo and Bohte (2012) is that the indirect effect is highly possible and hence, should be taken into account. It means that growth in defence spending can have an impact on social benefits expenditures through the sources of government income as well as economic growth in general (Oatley, 2015). Therefore, many scholars came to the conclusion that one of the most efficient models which accounts for both is Vector Autoregression (Oatley, 2015; Carter et al., 2021).

3.1 Vector Autoregression

The Vector Autoregression (VAR) model is the stochastic process which relates the estimation of variables with their past values as well as the past observations of other variables. It was introduced by Sims (1980) and it can be understood as the extension to the normal AR(p) model. It allows the estimated value to be explained not only by the lags of this same variable but also by the past values of the other variables too. The simple form of VAR with two elements and one lag can be represented as

$$\begin{bmatrix} \hat{y_{1,t}} \\ \hat{y_{2,t}} \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} + \begin{bmatrix} a_{1,1} & a_{1,2} \\ a_{2,1} & a_{2,2} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \end{bmatrix} \tag{3.1}$$

In this example values $\hat{y_1}$ and $\hat{y_2}$ are estimated, c_1 and c_2 are constant terms, matrices with a's represent coefficients for the lags of y_1 and y_2. And the last vector represents the error terms. However, the main limitation of VAR is that it treats all variables as endo-

genous, assuming that no external factors can influence the model. Therefore, in the case of the exogenous disturbance, it is impossible to disentangle the cause and the direction of its effect (Lütkepohl, 2007). For example, if there was a shock in y_1 and we observed a response in y_2, it would be impossible to identify whether the shock in y_1 caused the response in y_2 or vice versa. In order to deal with this problem, it is necessary to change the VAR to Structural Vector Autoregression (SVAR). The main difference between them is the existence of the B matrix which represents the contemporaneous effects of shocks in one variable, on the other variable. Hence, the Structural VAR formula looks in the following way

$$\begin{bmatrix} b_{1,1} & b_{1,2} \\ b_{2,1} & b_{2,2} \end{bmatrix} \begin{bmatrix} \hat{y_{1,t}} \\ \hat{y_{2,t}} \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} + \begin{bmatrix} a_{1,1} & a_{1,2} \\ a_{2,1} & a_{2,2} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \end{bmatrix} \tag{3.2}$$

However, in order to be able to identify the effect of the shock using Structural VAR, it is necessary to impose additional restrictions (Lütkepohl, 2007).

3.2 Identification scheme

There are several identification schemes for the SVAR which solve the identification issue and impose the required restrictions. They have to be chosen based on the theoretical background and economic beliefs. The most commonly used one is Cholesky Identification. As mentioned by Lütkepohl (2007), several assumptions and restrictions need to be considered. The most essential one is that the ordering of variables determines their impact on other variables. This means that we assume that the y_1 can contemporaneously influence y_2. But y_2 can't directly influence y_1. Therefore, ordering should be picked based on the economic importance and rationale for the relationships between the elements of the equation. Using this assumption, it will be possible to decompose error terms, and in this way determine the effect of the exogenous shock on one variable on another. The other assumptions are - shocks are exogenous and independent of each other and that variances and means of all the variables in the model are stationary.

$$\begin{bmatrix} b_{1,1} & 0 \\ b_{2,1} & b_{2,2} \end{bmatrix} \begin{bmatrix} \hat{y_{1,t}} \\ \hat{y_{2,t}} \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} + \begin{bmatrix} a_{1,1} & a_{1,2} \\ a_{2,1} & a_{2,2} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \end{bmatrix} \tag{3.3}$$

3.3 Impulse Reaction Function

The results of the SVAR model are usually hard to interpret meaningfully since it is represented as a table with coefficients for each lag of all the variables, constants and errors. Because of this reason, many scholars are using structural analysis tools to find insights from VAR. One of the methods which is widely used among researchers is Impulse Reaction Function (IRF). Firstly, it finds the immediate response of the variables in the model on the exogenous shock in one of the variables. After that, it tracks the impact of this shock on the element of interest, while holding the rest of them constant. This tool shows how the variable responds to the shock in the other variable over time, and how many periods it will take to converge back to steady-state values (Lütkepohl, 2007; Ronayne, 2011).

This method is widely used in the fields of social studies, and especially often in economics and finance. One of the most famous examples of using IRF was demonstrated by Blanchard and Quah (1988). The authors applied this method to trace the impact of aggregate supply and aggregate demand shocks on output and unemployment. While being popular and widely used, IRF also has several limitations. One of them is that the effect of the shock is assumed to be temporary, without any persistent impact. Another one is that it is not simple to establish causal relationships with IRF since it requires all the assumptions to hold. In reality, it is difficult to be certain regarding the absence of exogeneity issues in the model. Another point is the identification restrictions in causal analysis which are often economically reasonable, but they should not be considered rigid rules.

Nevertheless, this method allows us to see if the exogenous shock in a variable will influence a change in the other variables, and how it changes over time. Moreover, it appeared to be efficient in the works which studied the "guns/butter" trade-off (Oatley, 2015; Carter et al., 2021) and in general can be considered as a good tool to suggest the existence of the relations between those spendings and between expenditures on defence and GDP.

Chapter 4

Empirical model

4.1 Data

For this research, it was decided to explore NATO countries which are considered to be relatively small in terms of their military spending (Odehnal and Neubauer, 2020). For example, the USA, the UK, Germany and France are considered to be large, however, countries like the Netherlands, Sweden, Poland and others are assumed to be relatively small. Another important aspect which was taken into account is the attitude of the country to social benefits. In order to categorize the countries it was decided to use the threshold of 23,9% of the GDP, which is the average among European countries (Eurostat, 2022). Also, different sources of government income were used in this model, as they were shown to be essential to establish the trade-offs (Heo and Bohte, 2012; Oatley, 2015; Carter et al., 2021). All in all the following variables were used in the research:

Table 4.1: Variable Definitions

Variable	**Definition** z
GDP	Taken in constant 2015 dollars (The World Bank, 2022)
Military Expenditures	Taken from the World Bank database as a share of GDP (The World Bank, 2020)
Social Spendings	Taken from the OECD database as a share of GDP (European Central Bank, 2019)
Central Government Debt	Taken from the International Monetary Fund database as a share of GDP (International Monetary Fund, 2022)
Tax Revenues	Taken from the World Bank database as a share of GDP (The World Bank, 2021)
Money Supply	Broad money (M3) from the World Bank database as a share of GDP (The World Bank, 2023)

For the analysis, all the values were further transformed into the 2015 US dollars.

4.1.1 Countries

Here is presented a list of the countries which will be used in this analysis. Additionally, short descriptions are included with the reasoning of why they are interesting for the "guns-versus-butter" trade-off research:

1. Denmark - an important state in Northern Europe. In order to raise money for the government budget, it would rather increase Government Debt or Money Supply, than Taxes (Danmarks Nationalbank, 2022). Moreover, this country is very interesting for the research, since it spends on social welfare about 27-33% of the GDP, which is significantly more than the average European country (Eurostat, 2022), even having a relatively lower level of GDP.

2. Turkey - a middle-income country which heavily invests in its military development and is located in an essential geographical position, connecting Europe and Asia. It spends only about 10-13% of its GDP on social benefits, which is less than the average value among other countries (Eurostat, 2022). Moreover, whenever it needs some additional income it would prefer to increase Money Supply, then Taxes or Debt (Central Bank of the Republic of Turkey, 2022).

3. Poland - the land in Eastern Europe which allocates 20-23% of GDP on social expenditures (Eurostat, 2022). While this level is close to the average values in Europe, Poland is categorized as a country with relatively low social expenditures in this analysis. This country is particularly interesting for the study since its economy overall is one of the largest in Eastern Europe, and it gives a lot of attention to the development of the defence system. Unlike other researched countries it is relatively indifferent between raising money with Debt or Money Supply, leaving Taxes untouched (Narodowy Bank Polski, 2001).

4. Norway - Scandinavian country, which was among the founders of NATO in 1949. It is known for its oil wealth, high social spending and relatively easy approach towards an increase in Taxes. Norway is classified as a country with relatively high social expenditures since it keeps them on the level 24-30% of GDP (Eurostat, 2022). Moreover, it would prefer to finance additional spendings with an increase in Tax Revenue or Money Supply, then from the increased Government Debt (Central Bank of Norway, 2001). Researching this country can provide insights regarding the magnitude of the trade-offs for the resource-rich states.

The chosen countries enable a comparative analysis of the trade-off across Nordic, Eastern European, and Mediterranean regions. The assumptions about their preference towards different government income sources are also supported by the values in Table 4.2.

Moreover, their distinct attitudes towards defence and social spending, debt, taxes and money supply make them relevant for inclusion in the analysis.

4.1.2 Variables' details

For this analysis, panel data is required. It is essential for the time series research to include as much data as possible, in order to have robust and trustworthy results. Therefore, it was decided to use the maximum available range of the annual data. However, those periods vary between countries, since for some of them particular information was missing, was not available for public use, or the country itself gained independence later. Hence, for Denmark and Turkey, the 1980-2019 range will be used, for Norway - 1988-2019, and for Poland from 1994 to 2019, since it became independent from the USSR only in 1990. It was decided to make use of 2019 as the latest year, since including the Coronavirus crisis could adversely affect the outcomes. The disruptive nature of the pandemic could significantly impact economic indicators, making them less reliable for analysis.

The detailed descriptive statistics for each variable per state can be found in the Appendix (Table A.1, Table A.2, Table A.3, Table A.4). Additionally, average values for the corresponding periods for each country are shown in Table 4.2.

Table 4.2: Means of the variables represented as billions of 2015US dollars

Country	Social (in billions)	Debt (in billions)	GDP (in billions)	Military (in billions)	Broad (in billions)	Tax (in billions)
Denmark	76,826	117,083	283,024	3,852	164,908	92,713
Norway	77,070	62,964	344,202	5,796	199,014	87,707
Poland	78,484	169,784	378,218	7,226	203,250	64,415
Turkey	65,442	231,337	617,785	15,637	291,208	147,159

Note: The table represents average values of the variables for the following periods: Denmark, Tukey - 1980-2019, Norway - 1988-2019, Poland - 1994-2019.

4.2 Research design

4.2.1 Model specification

In order to research the existence of "guns/butter" and "guns/economic growth" trade-offs in the following countries - Denmark, Norway, Poland and Turkey, Structural VAR models are going to be estimated. The variables chosen for the analysis are - GDP, Military spending, Social spending, Debt, Money Supply and Tax Revenue. They will allow us

to investigate the trade-offs, taking into account different country's preferences to finance the budget and hence, capture the indirect effects as well as the direct ones. These elements were used in previous analyses and were found to be significantly explanatory (Heo and Bohte, 2012; Oatley, 2015; Carter et al., 2021). Moreover, the variables were shown to be robust against endogeneity issues, therefore they are also assumed to be robust in the present analysis (Carter et al., 2021).

The Cholesky decomposition will be used as an identification scheme since it imposes strict ordering requirements and thus allows to produce more robust and trustworthy results (Lütkepohl, 2007). Moreover, it was shown to be effective in establishing reliable outcomes in the previous research of the "guns/butter" trade-off which used Structural VAR (Oatley, 2015; Carter et al., 2021). It requires the specific variables ordering, which takes into account the relative importance of variables for each country. Notably, the first variable for each country is GDP, since we assume that economic growth influences both the spendings and all the sources of income. Military spending always has the second order in the equations. It reflects that governments are limited by the size of the economy and will allocate resources to the military based on their perceived need for national defence. Consequently, defence spending can be affected by the size of the country's economy, but cannot be contemporaneously influenced by other variables. Comparable assumptions were made in the other prominent paper by Carter et al. (2021) which researched a similar topic. The positioning of the other variables for the four analysed countries can be explained by the relative importance of the different sources of financing in the different countries and the economic assumptions discussed in the Data section. Hence, the income sources which are ordered to the left are assumed to be used less for raising additional money for the military, than those which are positioned to the right. The orderings are following:

1. Denmark. Order of variables: GDP → Military Spending → Social Spending→ Tax Revenue → Debt → Money Supply
2. Norway. Order of variables: GDP → Military Spending → Social Spending → Debt → Tax Revenue → Money Supply
3. Poland. Order of variables: GDP → Military Spending → Tax Revenue → Debt → Money Supply → Social Spending
4. Turkey. Order of variables: GDP → Military Spending → Tax Revenue → Debt → Money Supply → Social Spending

4.2.2 Defining the Model Framework

One of the important assumptions for the specification of the VAR models is that all the variables are stationary (Lütkepohl, 2007). This step ensures the reliability and validity of the model's result. As a first step to test this assumption, the graphs for each country were plotted and displayed in the Appendix (Figure A.2, Figure A.3, Figure A.4, Figure A.5). The figures suggest the absence of the constant mean value and therefore the stationarity is highly unlikely. This is confirmed by the values in Table 4.3 which represents test statistics for each of the Augmented Dickey-Fuller tests. The visual analysis of the graphs and tests on the level series indicate that we cannot reject the null hypothesis that the series contains a unit root, hence the stationarity assumption is violated.

Table 4.3: ADF test results for actual data

Variable	t-statistic			
	Denmark	**Norway**	**Poland**	**Turkey**
GDP	-0.151	-1.47	2.606	2.941
Military	-3.496**	-1.324	2.325	1.262
Tax	-0.293	-1.441	1.59	1.531
Social	0.203	-0.237	2.408	4.276
Debt	-2.428	-3.605**	0.205	-0.756
Broad	-0.914	1.208	3.337	4.398

Note: * p≤0.1, ** p≤0.05, *** p≤0.01.

To deal with the non-stationarity it is necessary to apply the transformation of data (Enders, 2014). There are multiple different techniques to modify the variables and reach stationarity: differencing, taking natural logarithms, growth rates and others. Since most of the figures depict a clear trend, it is important to use one of those methods to deal with the detrending of the data.

In this research, the growth rate was chosen as a transformation technique. The growth rate modification removes the trend from the variables and also stabilises the variance, which leads to a significant improvement in stationarity. Moreover, this detrending method was shown to be efficient in the previous studies of the "guns-versus-butter" trade-off (Carter et al., 2021). The figures which represent the growth rate of the variables for each country can also be found in the Appendix (Figure A.6, Figure A.7, Figure A.8, Figure A.9). Table 4.4 shows the new test statistics for each of the Augmented Dickey-Fuller tests.

Table 4.4: ADF test results for transformed data

Variable	t-statistic			
	Denmark	**Norway**	**Poland**	**Turkey**
GDP	-4.63***	-2.77*	-4.96***	-6.48***
Military	-5.03***	-5.80***	-6.37***	-6.13***
Tax	-5.10***	-4.50***	-3.55**	-5.12***
Social	-5.13***	-4.74***	-5.43***	-6.72***
Debt	-3.27**	-4.33***	-4.88***	-6.35***
Broad	-5.97***	-6.98***	-4.45***	-8.01***

Note: p≤0.1, ** p≤0.05, *** p≤0.01.

The data presented in Table 4.4 indicates that modifying the growth rate had a positive impact on the stationarity of the variables. Importantly, it is possible to reject the null hypothesis that the series contains a unit root for each of the series specified when they are specified as growth rates. However, using this transformation technique also has its limitations. With data converted into the growth rate, it is harder to find significant relationships because the process of transforming the series removes certain elements of the series' data-generating processes. It can potentially eliminate interdependencies that may exist among the variables in the VAR model.

The next step in the model specification is to determine the amount of lags needed. Two common criterions that are normally used for this purpose are Schwarz Bayesian information criterion (SBIC) and Akaike's information criterion (AIC). However, those tests suggested different numbers of lags. While for all the countries SBIC indicated that only one lag was necessary, AIC indicated the necessity of two lags. It was decided to settle on two lags to keep a balance between model simplicity and capturing potential lagged dependencies. Having that the nature of the data in this research is annual it is important to capture the delayed responses or dependencies that might be present in the data. These dependencies can be better captured by using two lags, as compared to one lag. Finally, to perform this analysis the following Structural VAR model is going to be used

$$B\hat{Y_t} = A_0 + \sum_{p=1}^{2} A_p Y_{t-p} + e_t \tag{4.1}$$

In this notation B matrix represents contemporaneous impacts of variables on each other, $\hat{Y_t}$ is a vector with the estimated variables, A_0 is the vector with constant values, p is the iterator of the lags, n represents the total amount of lags, A_p is the matrix with the coefficients for the lags, Y_{t-p} represents the vector with the lagged values of the variables and e_t is the vector with error terms. The full version can be found in the Appendix (Figure A.1). This Structural VAR is estimated separately for each country, taking into account different orderings. The final conclusions will be made based on the results of the IRF.

Chapter 5

Results

Firstly, the VAR models were simulated, and the corresponding tables are represented in the Appendix (Table A.5, Table A.6, Table A.7, Table A.8). But, as described in the Methodology part, VAR tables do not have a meaningful interpretation. Hence, IRF is used to gain valuable insights from the analysis. The steady-state for each variable is defined as the equilibrium state of a system. It means it is the level at which the variable would settle in the long-run in the absence of any further shocks or disturbances. The results that identify the effect of an increase in military spending on social expenditures will be presented for each country. After that, it will be discussed how the growth in defence spending affects economic development.

5.1 The influence of Military Spending on Social Expenditures

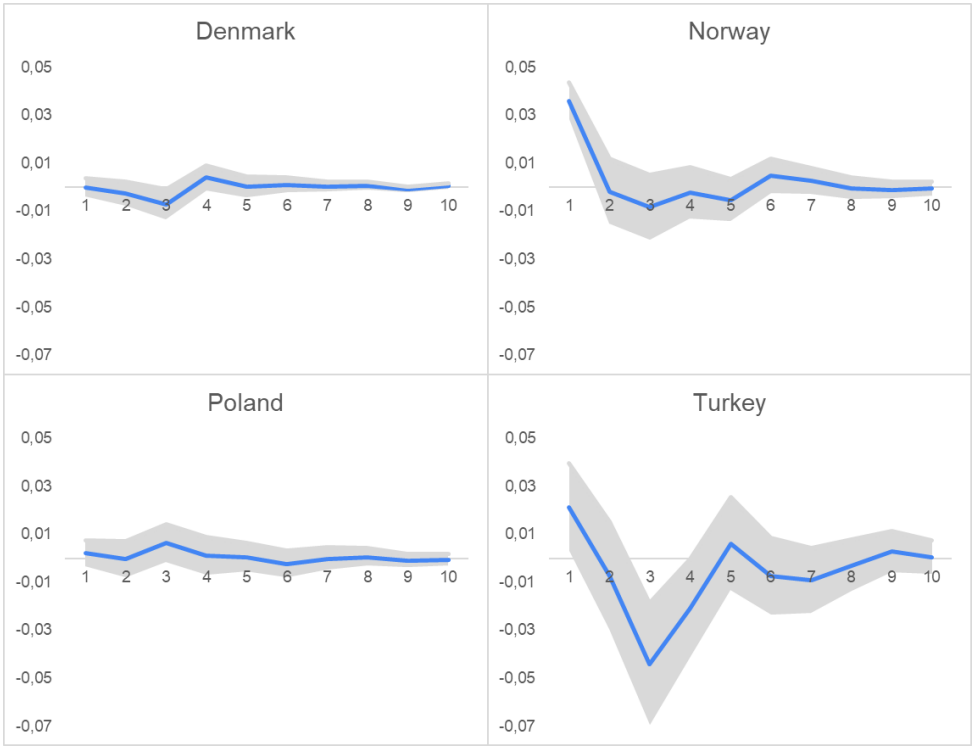
Figure 5.1 presents the effect of a one-period, one standard deviation increase in Military Spending on Social Spending with a 95% confidence interval in different countries over 10 periods. The first result that can be noticed is that increase in military spending affects social spending differently in every country. Most importantly, the short-term trend is that the spendings on social benefits grows or remains unchanged. More specifically, the magnitude of the change differs among countries - while for Norway and Turkey, it increases in the first year by 4% and 2%, respectively, social spending remains relatively unchanged for Poland and Denmark.

However, in the period of 2-6 years, the social spending reaction to a military expenditures shock varies notably per country. The total effect for Norway and Denmark fluctuates with a magnitude of only 1% around the steady-state level. Notably, Poland experiences a solely positive effect of 1% above the long-run value. The opposite situation can be observed for Turkey which decreases the social spending by 4-6% from the steady state

level. This fact suggests the existence of a "guns-versus-butter" trade-off for this country in the long term.

It is essential to notice that for all of the examined countries, it took different amounts of time to return to steady state values. Denmark and Poland barely experience any shock in expenditures on social benefits. For Norway, the shock lasts only 1 year, after which social spending returns to steady-state values. The most volatile social spending experience is in Turkey, where it comes back to a stable level of growth after 5 years.

Figure 5.1: Effect of Increasing Military Spending on Social Spending



5.2 The influence of Military Spending on Economic Development

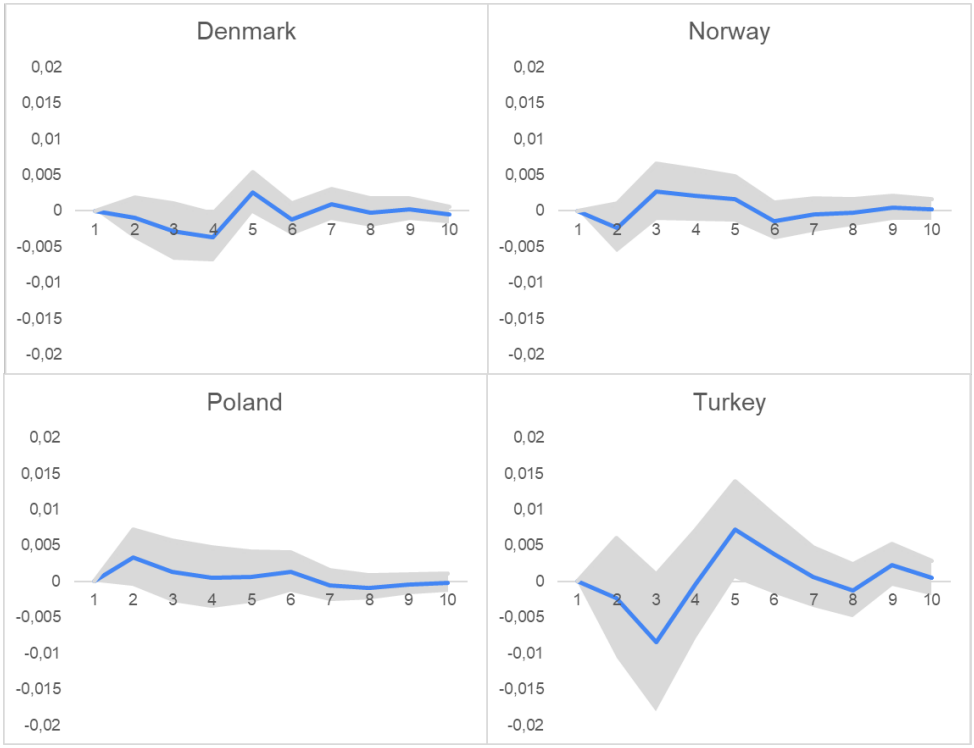
Figure 5.2 presents the effect of a one-period, one standard deviation increase in Military Spending on GDP with a 95% confidence interval in different countries over 10 periods. According to Figure 5.2, none of the countries experience a reaction in the first period in GDP to the increased expenditures on the defence in the first period. This can be explained by variable ordering which was imposed in the model specification. It means, that in this model, it is assumed that economic development can directly influence all other variables, however military spending can influence GDP only indirectly. Due to this

reason, there was no immediate reaction in GDP.

The results represented in Figure 5.2 shows a similar effect of military spending on economic growth for Denmark, Norway and Turkey. For those countries, the growth rate of GDP firstly decreases and grows above the steady-state level afterwards. A different situation can be observed for Poland - its economy experiences a slight growth up to 0.35% and returns to the steady-state after 6 years.

Notably, the magnitude and length of the effect varies among the countries. For both Denmark and Norway, additional spending on defence implies the reduction in the growth rate of GDP by 0.2-0.4%, after which it increases by 0.2% above the steady-state level. However, for Denmark the period of reduction lasts longer - for 4 years, and for Norway it takes only 2 years to reach the increased growth rate of GDP. For Turkey, the effect is more tangible - reaching a 1% drop in GDP in the 3rd year after the shock, and recovering to more than steady-state level by 1% after 5 years from the military spending increase.

Figure 5.2: Effect of Increasing Military Spending on GDP



Chapter 6

Conclusion

The analysis made in this research contributes to the existing literature, by exploring how the military expenditures affect social spending and economic development for the small allied countries. Four countries were analysed - Denmark, Norway, Poland and Turkey, and the results of the VAR models and Impulse Responses suggested the following conclusions:

Firstly, it was shown that social and military spendings are closely interrelated with money supply, tax, debt and economic growth, which can be seen in the VAR tables in Appendix (Table A.5, Table A.6, Table A.7, Table A.8). This finding aligns with the ones made by Heo and Bohte (2012), Oatley (2015) and Carter et al. (2021), who focused on the USA. Furthermore, this research established that this fact holds for the other NATO allies too. This outcome suggests that the previous analysis of this trade-off for small allied countries performed by Palmer (1990) was incomplete since the author did not include money supply, tax, debt and economic growth in the model.

Secondly, it was found that social expenses rise together with military expenditures, or stay relatively unchanged after the exogenous shock in defence spendings. This holds for countries which allocate relatively a lot to social benefits (Denmark and Norway) in the medium-run. These findings are consistent with the previous studies (Carter et al., 2021) and allow us to suggest that the first hypothesis holds. However, in this research, the effect is significantly smaller. This difference can be partly explained by the fact that annual data was analysed, while in the previous papers, quarterly data was used, which could be more volatile. For the countries which allocate relatively less to social benefits, the findings are ambiguous. For Poland, there is a slight positive response to the increase in military spendings. On the other hand, for Turkey, there is a significant drop in social spending after the first years, but after that, it returns to the steady state value. The results for Turkey are consistent with the previous findings (Oatley, 2015; Carter et al., 2021) and demonstrate a presence of the "guns-versus-butter" trade-off in the first 3 years.

In the case of Poland, no trade-off was detected. These conflicting outcomes suggest that in the long-run, it is important to pay close attention towards the general militarisation of countries since it can be one of the reasons for this difference in reactions. While Poland spends annually 1,9% of their GDP on average on defence, Turkey invests on average 2,5% (The World Bank, 2020). Moreover, it can be the case that "guns-versus-butter" is present for Turkey since it is participating in the military operations against Iraq and Syria (Reuters, 2022) and has long-lasting tensions with Greece (Stamouli, 2022). Hence, due to the threat or active usage of its military forces, the Turkish government may prioritize military spending over social expenditures. Since the situation in Poland is different and it does not have either the threat of active conflict or military operations, its government may be less willing to reduce social spending in order to finance defence costs. It is important to specify that the research is conducted for a period in which there were no active military conflicts in Europe. Hence, countries in Eastern Europe were not under threat. The situation after 2022 and the start of the Russian invasion could radically change it (Butler and Butler, 2023).

Thirdly, it is found that the effect of the exogenous shock in military spending on economic growth significantly varies over time but generally has a similar pattern among different countries. This holds for Denmark, Norway and Turkey. After the first couple of years, the growth rate of GDP drops, but a couple of periods after it returns to the steady-state values, and slightly exceeds it afterwards. Finally, within 7 years, all of the countries' economies returned to the equilibrium values. This finding suggests that the second hypothesis, regarding the purely negative effect of military spending on economic development, needs to be rejected. Moreover, the outcome is similar to what was found by Heo and Bohte (2012) and Carter et al. (2021) and thus, shows that the mentioned pattern of the military spending - GDP relationships indeed exists. The only country which shows a different reaction is Poland - for it the shock in expenditures on defence coincided with economic growth, which differs from the previous research findings. The reason for it can be the fact that Poland is a developing country with a relatively high growth pace. Furthermore, the Eastern European countries which regained independence after the fall of the iron curtain show relatively high growth rates as compared to the other major economies (Statista, 2022). Therefore, it can be the case that indirect adverse effects of military spending on GDP, which were found for other countries, do not have an influence on the economic development of rapidly growing and recently independent nations.

Taken together, the conclusions of this analysis are generally consistent with the previous researches, although some deviations were found. As an answer to the research question - small allied countries in general do not encounter the "guns-versus-butter" trade-off, in case the country allocates a relatively big share of the budget to the social

spendings. Nevertheless, this trade-off is present if the country has a high orientation to the military and spends relatively less on social benefits. For Poland, which allocates relatively less to social expenditures, it was found no reduction in spending on social benefits to finance the defence costs. Moreover, unlike other examined countries, the effect of an increase in military spending on economic growth in Poland is not marginally high, but consistently positive. This suggests that for future studies it would be beneficial to examine the "guns/butter" trade-off for the Eastern European countries. For them, the effect of increased defence spending on social expenditures and economic growth seems to differ from the other allied countries.

Additionally, in order to improve the results of this research, it is advised to analyse quarterly or monthly data for the larger range of the small allied countries. It can provide insights for the short-run dynamic interconnections between the military and social spending, which together with this research of the long-run effect, can efficiently support the policymaking process.

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Appendix A

Table A.1: Full descriptive statistics for Denmark presented in billions of 2015 US dollars.

Index	GDP	Military	Social	Debt	Broad	Tax
mean	283,0237	3,8523	76,8264	117,0826	164,9084	92,7125
std	26,0449	0,2291	12,7550	25,2466	29,1898	11,5728
min	233,2320	3,3640	58,1767	79,7354	126,7487	74,3540
25%	266,0245	3,7431	65,6441	95,4279	137,4313	80,8324
50%	285,7917	3,8948	76,7366	112,3297	171,3312	92,9718
75%	294,8618	3,9707	87,7797	133,9396	189,2784	102,8468
max	332,6025	4,3603	94,5789	169,0466	207,6148	115,3792

Table A.2: Full descriptive statistics for Norway presented in billions of 2015 US dollars.

Index	GDP	Military	Social	Debt	Broad	Tax
mean	344,2020	5,7958	77,0703	62,9641	199,0147	87,7072
std	40,7230	0,6869	13,6289	12,0910	37,9258	10,9964
min	266,2390	4,9317	57,7233	40,2088	139,3810	63,7292
25%	312,4977	5,2396	67,0600	58,0452	177,2459	81,7628
50%	352,8778	5,6463	74,0721	59,9362	201,3092	89,9115
75%	372,8777	6,2156	82,5985	68,7147	220,6259	95,5380
max	406,4680	7,5539	102,7470	90,8858	267,9667	100,4268

Table A.3: Full descriptive statistics for Poland presented in billions of 2015 US dollars.

Index	GDP	Military	Social	Debt	Broad	Tax
mean	378,2183	7,2258	78,4837	169,7843	203,2498	64,4152
std	100,2069	2,0110	20,1037	54,1289	97,0555	15,4163
min	230,5147	4,5363	50,6856	93,5513	74,8485	45,6812
25%	288,8565	5,4937	62,9394	116,2533	124,4666	50,1607
50%	378,7711	6,9590	75,3096	166,4423	187,8916	65,4527
75%	444,4089	8,0801	91,2115	215,3331	269,4125	71,9052
max	571,5031	11,2646	121,0787	246,1086	390,8813	99,0785

Figure A.1: Full formula of the used SVAR model

$$\begin{bmatrix} b_{1,1} & 0 & 0 & 0 & 0 & 0 \\ b_{2,1} & b_{2,2} & 0 & 0 & 0 & 0 \\ b_{3,1} & b_{3,2} & b_{3,3} & 0 & 0 & 0 \\ b_{4,1} & b_{4,2} & b_{4,3} & b_{4,4} & 0 & 0 \\ b_{5,1} & b_{5,2} & b_{5,3} & b_{5,4} & b_{5,5} & 0 \\ b_{6,1} & b_{6,2} & b_{6,3} & b_{6,4} & b_{6,5} & b_{6,6} \end{bmatrix} \begin{bmatrix} \hat{GDP_t} \\ \hat{MilitarySpending_t} \\ \hat{SocicalSpending_t} \\ \hat{Debt_t} \\ \hat{MoneySupply_t} \\ \hat{TaxRevenue_t} \end{bmatrix} = \tag{A.1}$$

$$\begin{bmatrix} c_1 \\ c_2 \\ c_3 \\ c_4 \\ c_5 \\ c_6 \end{bmatrix} + \sum_{p=1}^{2} \begin{bmatrix} a_{1,1} & a_{1,2} & a_{1,3} & a_{1,4} & a_{1,5} & a_{1,6} \\ a_{2,1} & a_{2,2} & a_{2,3} & a_{2,4} & a_{2,5} & a_{2,6} \\ a_{3,1} & a_{3,2} & a_{3,3} & a_{3,4} & a_{3,5} & a_{3,6} \\ a_{4,1} & a_{4,2} & a_{4,3} & a_{4,4} & a_{4,5} & a_{4,6} \\ a_{5,1} & a_{5,2} & a_{5,3} & a_{5,4} & a_{5,5} & a_{5,6} \\ a_{6,1} & a_{6,2} & a_{6,3} & a_{6,4} & a_{6,5} & a_{6,6} \end{bmatrix} \begin{bmatrix} GDP_{t-p} \\ MilitarySpending_{t-p} \\ SocicalSpending_{t-p} \\ Debt_{t-p} \\ MoneySupply_{t-p} \\ TaxRevenue_{t-p} \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \\ \epsilon_3 \\ \epsilon_4 \\ \epsilon_5 \\ \epsilon_6 \end{bmatrix} \tag{A.2}$$

Table A.4: Full descriptive statistics for Turkey presented in billions of 2015 US dollars.

Index	GDP	Military	Social	Debt	Broad	Tax
mean	617,7847	15,6369	65,4418	231,3369	291,2083	147,1588
std	211,6019	3,5708	34,1078	54,5099	147,8603	55,4063
min	363,1403	12,6607	16,6100	118,8313	112,5437	67,0030
25%	414,8417	13,7003	35,1598	225,0229	157,3022	98,9196
50%	578,3835	14,7053	64,4566	249,3738	260,3688	133,5569
75%	785,9800	15,6915	91,6832	262,4943	408,7978	196,2974
max	996,3894	26,8016	123,8412	307,1283	586,4311	237,1061

Figure A.2: Panel data of the actual variables for Denmark

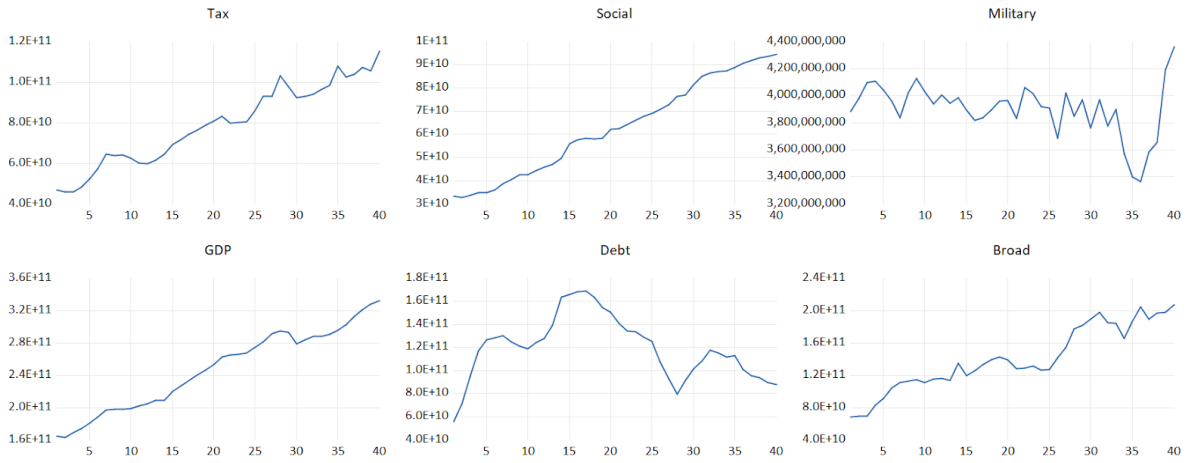

Figure A.3: Panel data of the actual variables for Norway

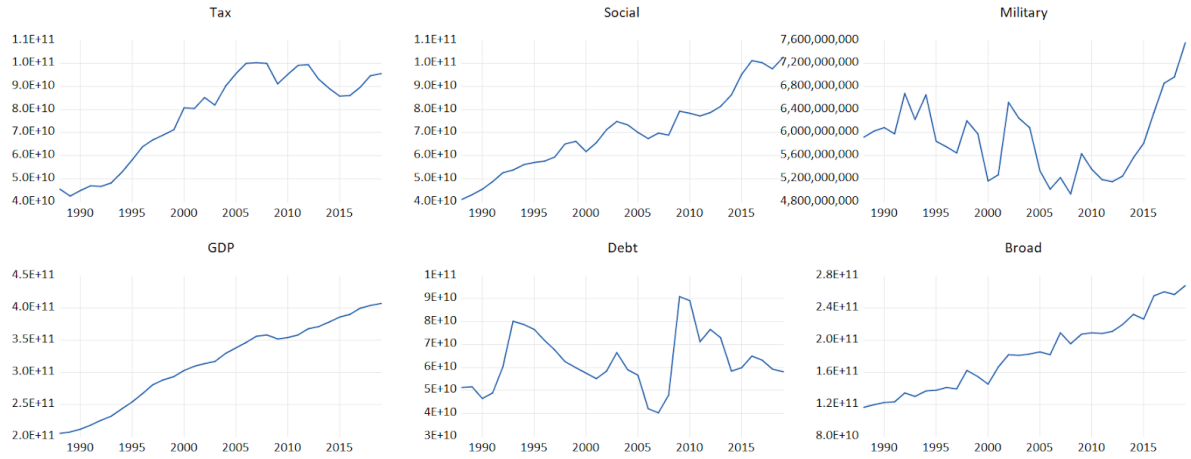

Figure A.4: Panel data of the actual variables for Poland

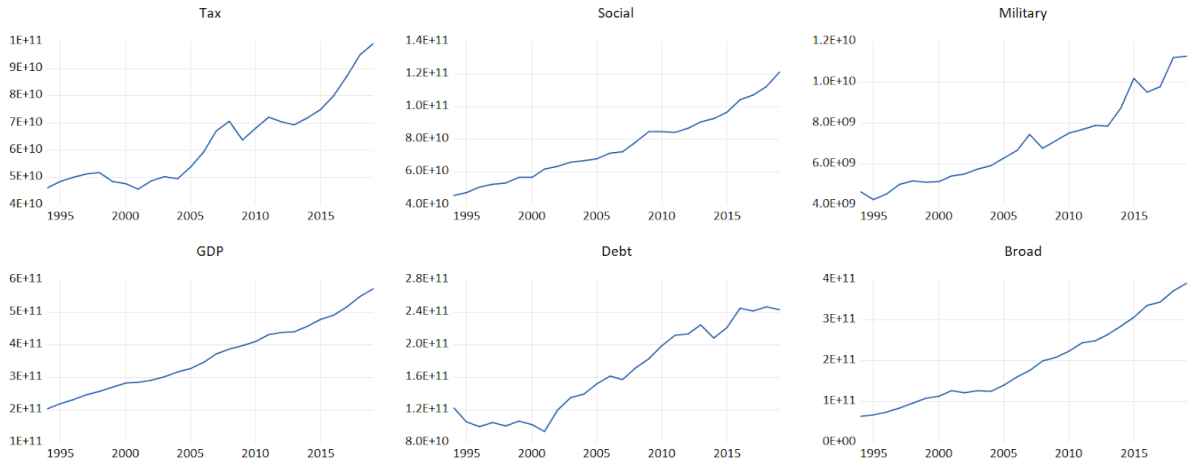

Figure A.5: Panel data of the actual variables for Turkey

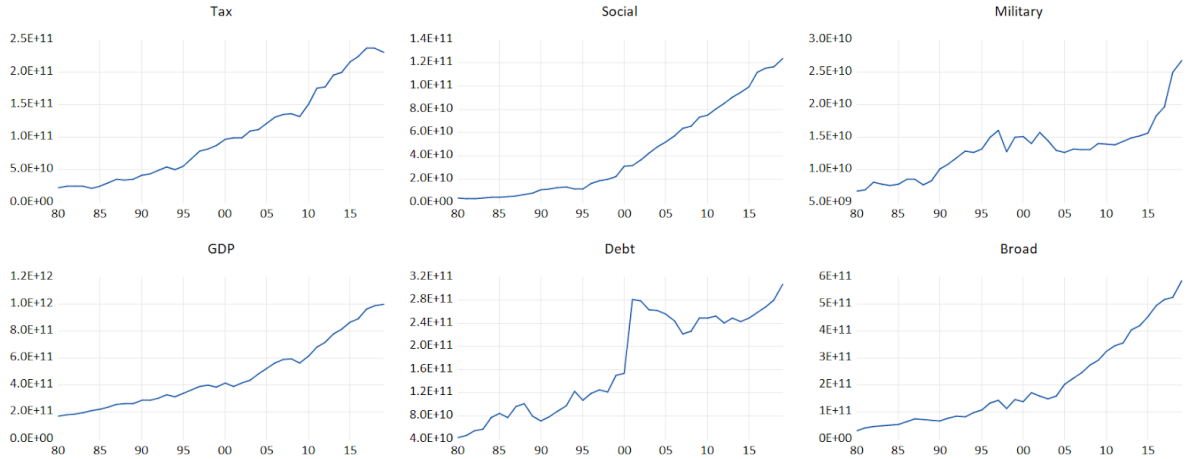

Figure A.6: Panel data of the growth rates of variables for Denmark

Figure A.7: Panel data of the growth rates of variables for Norway

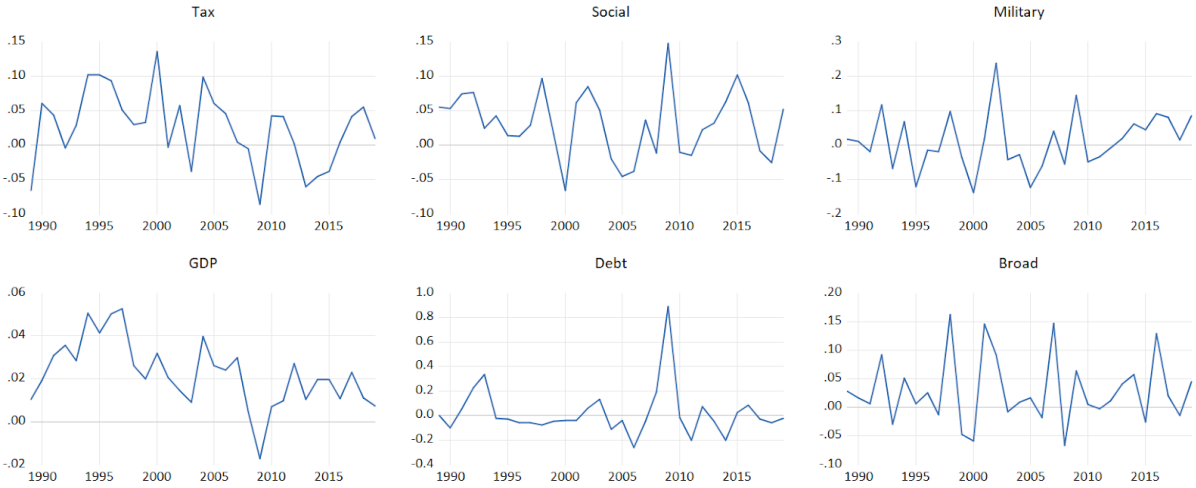

Figure A.8: Panel data of the growth rates of variables for Poland

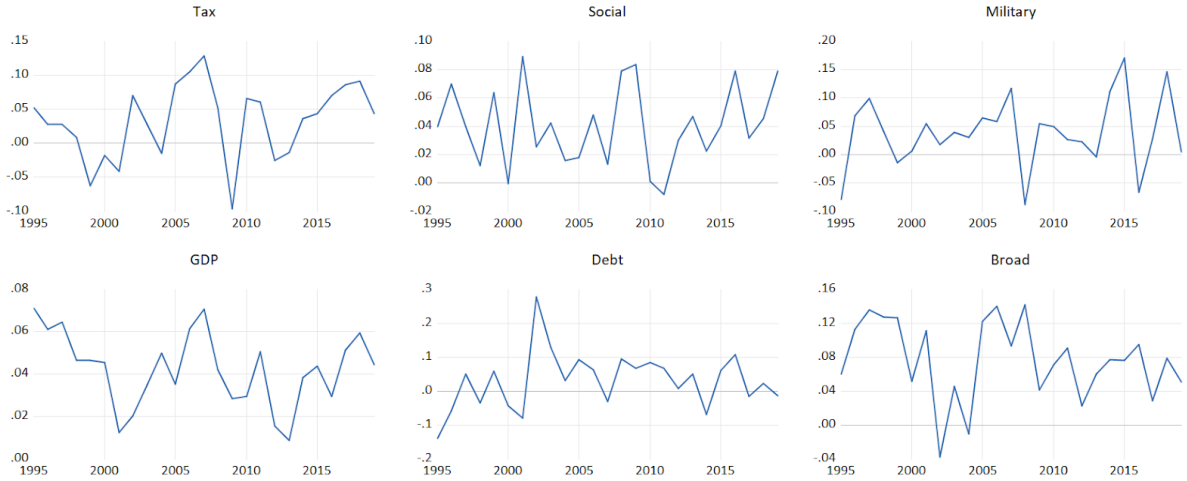

Figure A.9: Panel data of the growth rates of variables for Turkey

Figure A.10: Effect of Increasing Military Spending on Money Supply

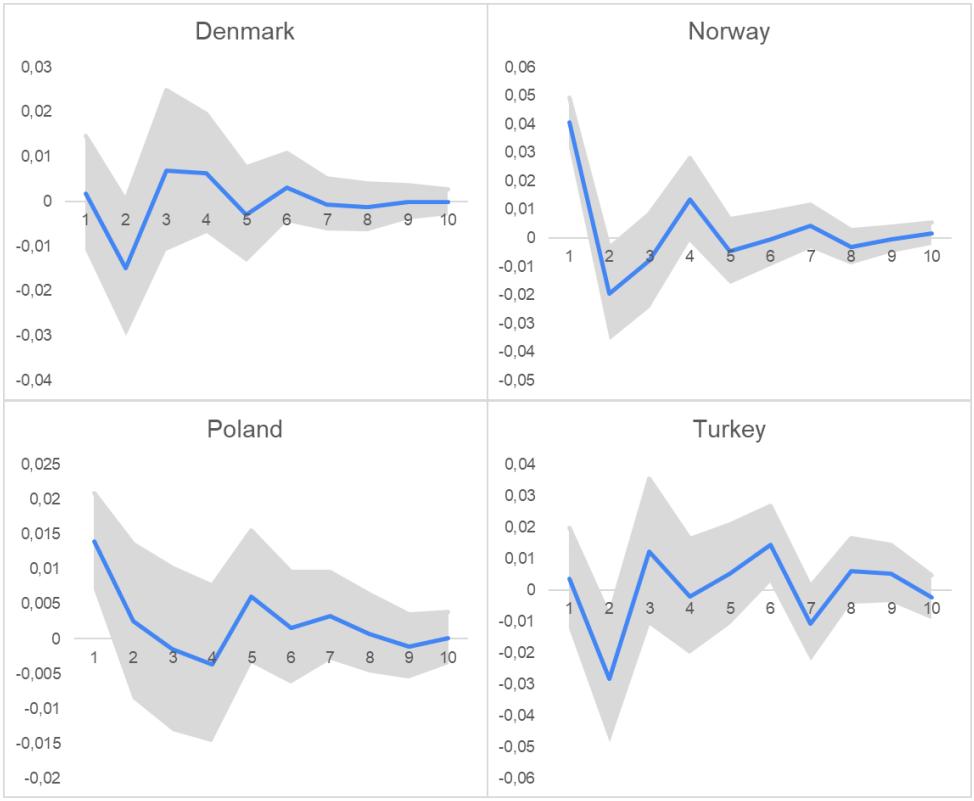

Figure A.11: Effect of Increasing Military Spending on Debt

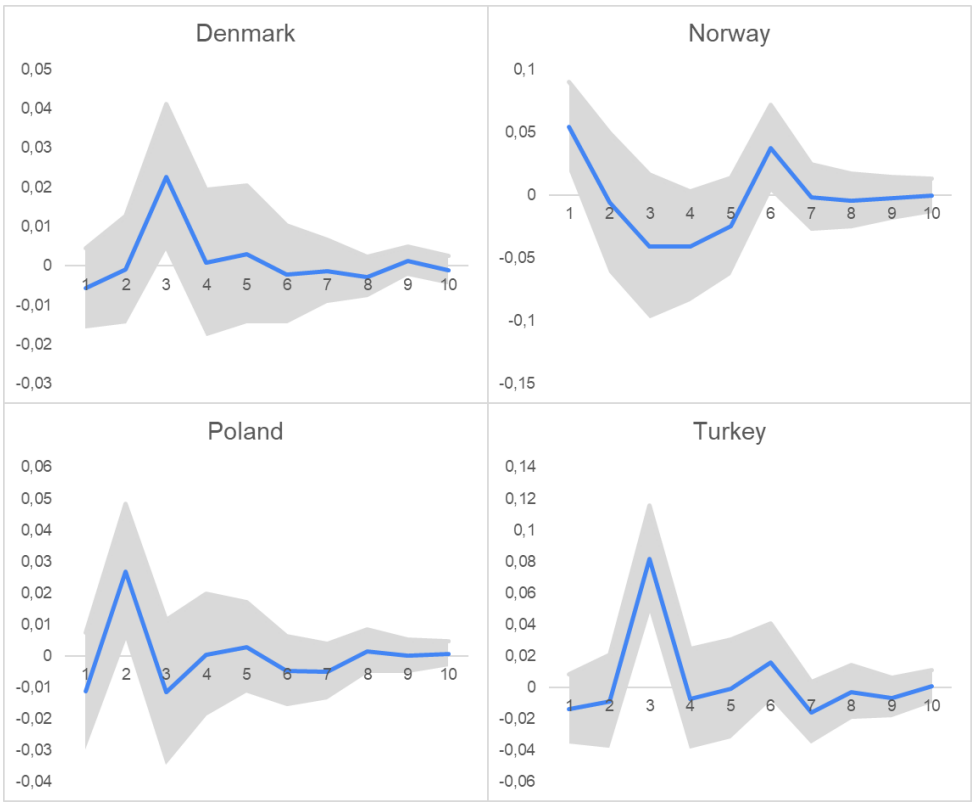

Figure A.12: Effect of Increasing Military Spending on Tax

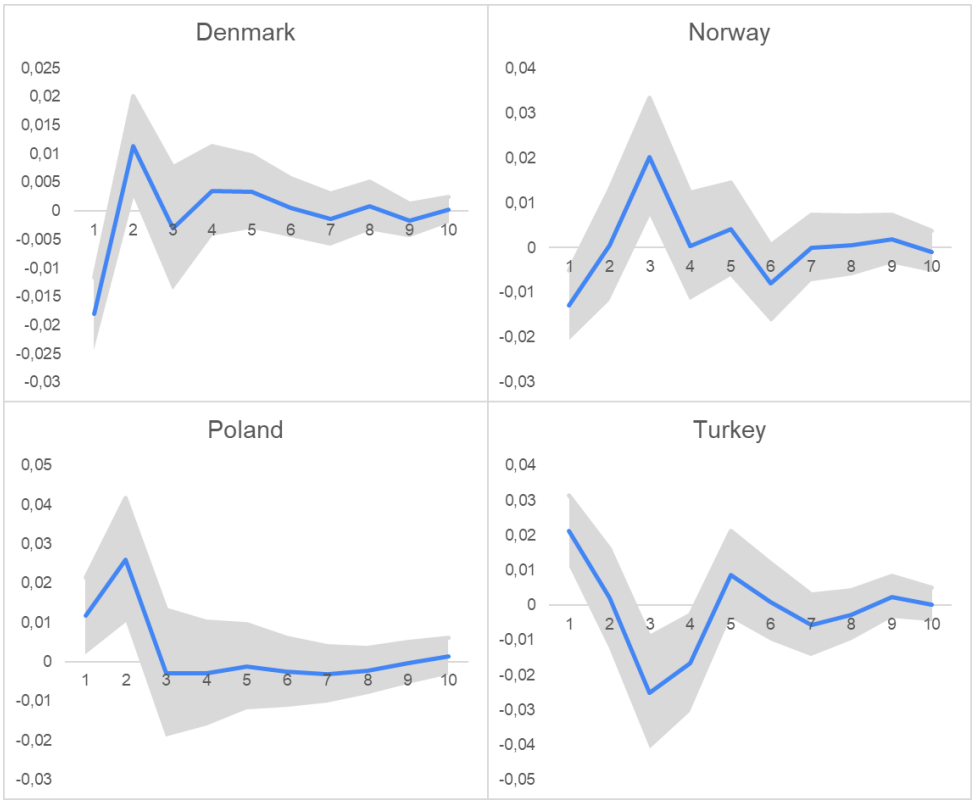

Table A.5: VAR model for Denmark

	GDP	MILITARY	TAX	SOCIAL	DEBT	BROAD
GDP(-1)	0.349380	0.754936	0.202460	−0.382122	−0.138460	0.886015
	(0.19766)	(0.61882)	(0.63484)	(0.33958)	(0.90161)	(1.07804)
	[1.76760]	[1.21997]	[0.31891]	[-1.12529]	[-0.15357]	[0.82188]
GDP(-2)	0.126175	0.703878	0.159695	0.031536	0.326519	0.017659
	(0.19771)	(0.61899)	(0.63502)	(0.33967)	(0.90187)	(1.07835)
	[0.63816]	[1.13714]	[0.25148]	[0.09284]	[0.36205]	[0.01638]
MILITARY(-1)	−0.056185	−0.247613	0.289232	−0.000315	−0.049758	−0.189857
	(0.06788)	(0.21253)	(0.21803)	(0.11663)	(0.30966)	(0.37025)
	[-0.82765]	[-1.16507]	[1.32654]	[-0.00270]	[-0.16069]	[-0.51278]
MILITARY(-2)	−0.038285	0.425117	−0.049641	−0.132599	0.376083	0.072536
	(0.08371)	(0.26207)	(0.26886)	(0.14381)	(0.38184)	(0.45656)
	[-0.45736]	[1.62213]	[-0.18463]	[-0.92202]	[0.98492]	[0.15887]
TAX(-1)	−0.049125	−0.467934	0.115944	0.104809	−0.242344	0.265328
	(0.08764)	(0.27438)	(0.28149)	(0.15057)	(0.39978)	(0.47800)
	[-0.56052]	[-1.70540]	[0.41189]	[0.69608]	[-0.60620]	[0.55507]
TAX(-2)	−0.080589	−0.047399	0.094922	0.135056	−0.489303	0.153085
	(0.08755)	(0.27408)	(0.28118)	(0.15040)	(0.39934)	(0.47748)
	[-0.92053]	[-0.17294]	[0.33758]	[0.89796]	[-1.22529]	[0.32061]
SOCIAL(-1)	0.067298	0.136430	−0.244113	0.171258	0.118280	−0.781092
	(0.10783)	(0.33758)	(0.34632)	(0.18525)	(0.49185)	(0.58810)
	[0.62413]	[0.40414]	[-0.70487]	[0.92449]	[0.24048]	[-1.32817]
SOCIAL(-2)	−0.153246	−0.067329	−0.380295	−0.123961	0.419153	−0.208547
	(0.10165)	(0.31823)	(0.32648)	(0.17463)	(0.46367)	(0.55440)
	[-1.50761]	[-0.21157]	[-1.16485]	[-0.70984]	[0.90400]	[-0.37617]
DEBT(-1)	−0.096556	−0.122774	−0.071098	0.134314	0.557571	0.260455
	(0.03781)	(0.11837)	(0.12144)	(0.06496)	(0.17247)	(0.20622)
	[-2.55372]	[-1.03718]	[-0.58546]	[2.06771]	[3.23287]	[1.26301]
DEBT(-2)	0.125535	0.027080	0.249328	−0.079588	−0.102516	−0.029806
	(0.03514)	(0.11000)	(0.11285)	(0.06036)	(0.16028)	(0.19164)
	[3.57275]	[0.24618]	[2.20931]	[-1.31844]	[-0.63962]	[-0.15553]
BROAD(-1)	0.063835	0.149979	−0.059739	0.025377	0.061236	−0.116980
	(0.04320)	(0.13523)	(0.13874)	(0.07421)	(0.19703)	(0.23559)
	[1.47783]	[1.10904]	[-0.43060]	[0.34197]	[0.31079]	[-0.49654]
BROAD(-2)	−0.052108	−0.055051	0.029331	0.062594	0.294413	0.065071
	(0.04074)	(0.12755)	(0.13086)	(0.07000)	(0.18585)	(0.22221)
	[-1.27897]	[-0.43159]	[0.22415]	[0.89425]	[1.58418]	[0.29283]
C	0.013363	−0.015829	0.028526	0.025360	−0.014936	0.033828
	(0.00573)	(0.01795)	(0.01841)	(0.00985)	(0.02615)	(0.03127)
	[2.33085]	[-0.88187]	[1.54914]	[2.57474]	[-0.57114]	[1.08183]

Table A.6: VAR model for Norway

	GDP	MILITARY	TAX	SOCIAL	DEBT	BROAD
GDP(-1)	0.303360	−1.562270	−0.484630	−1.004584	−0.373363	0.510289
	(0.30607)	(2.17118)	(1.31381)	(5.01619)	(1.17534)	(1.12579)
	[0.99114]	[-0.71955]	[-0.36887]	[-0.20027]	[-0.31766]	[0.45327]
GDP(-2)	0.039675	1.509247	1.173267	−0.140682	1.468033	−0.039109
	(0.28751)	(2.03952)	(1.23415)	(4.71202)	(1.10407)	(1.05752)
	[0.13799]	[0.74000]	[0.95067]	[-0.02986]	[1.32965]	[-0.03698]
MILITARY(-1)	−0.059874	−0.078708	0.171051	−0.420807	0.035751	−0.202995
	(0.06746)	(0.47852)	(0.28956)	(1.10554)	(0.25904)	(0.24812)
	[-0.88759]	[-0.16448]	[0.59073]	[-0.38063]	[0.13801]	[-0.81814]
MILITARY(-2)	0.007503	0.024249	−0.040321	−1.531682	−0.095862	0.225743
	(0.06321)	(0.44839)	(0.27133)	(1.03593)	(0.24273)	(0.23249)
	[0.11871]	[0.05408]	[-0.14861]	[-1.47856]	[-0.39494]	[0.97096]
BROAD(-1)	−0.046812	−0.369440	−1.051849	0.403281	−0.479499	0.160049
	(0.08272)	(0.58677)	(0.35507)	(1.35566)	(0.31764)	(0.30425)
	[-0.56592]	[-0.62961]	[-2.96240]	[0.29748]	[-1.50955]	[0.52604]
BROAD(-2)	−0.050833	−0.196293	−0.555458	2.034695	0.021738	0.001806
	(0.07936)	(0.56298)	(0.34067)	(1.30070)	(0.30477)	(0.29192)
	[-0.64050]	[-0.34866]	[-1.63048]	[1.56431]	[0.07133]	[0.00619]
DEBT(-1)	−0.012268	−0.124450	−0.094206	0.364874	−0.085196	0.027983
	(0.01895)	(0.13445)	(0.08136)	(0.31064)	(0.07279)	(0.06972)
	[-0.64723]	[-0.92559]	[-1.15789]	[1.17459]	[-1.17050]	[0.40138]
DEBT(-2)	0.012332	0.011008	0.026244	−0.350065	0.030655	0.082668
	(0.01789)	(0.12690)	(0.07679)	(0.29319)	(0.06870)	(0.06580)
	[0.68937]	[0.08674]	[0.34176]	[-1.19401]	[0.44624]	[1.25635]
SOCIAL(-1)	0.177638	0.282164	0.296042	−0.135611	0.492530	0.436514
	(0.11614)	(0.82389)	(0.49855)	(1.90348)	(0.44600)	(0.42720)
	[1.52946]	[0.34248]	[0.59381]	[-0.07124]	[1.10432]	[1.02180]
SOCIAL(-2)	0.106989	−0.231466	−0.045634	0.822018	−0.432693	0.038559
	(0.13155)	(0.93318)	(0.56469)	(2.15599)	(0.50517)	(0.48387)
	[0.81328]	[-0.24804]	[-0.08081]	[0.38127]	[-0.85653]	[0.07969]
TAX(-1)	0.056098	−0.515990	−0.151967	−0.085856	−0.103685	0.363646
	(0.08785)	(0.62318)	(0.37710)	(1.43977)	(0.33735)	(0.32313)
	[0.63856]	[-0.82799]	[-0.40299]	[-0.05963]	[-0.30735]	[1.12539]
TAX(-2)	0.095244	0.122323	0.091834	−0.632480	−0.320842	0.284354
	(0.08717)	(0.61834)	(0.37417)	(1.42859)	(0.33473)	(0.32062)
	[1.09265]	[0.19782]	[0.24544]	[-0.44273]	[-0.95850]	[0.88689]
C	0.005412	0.042475	0.054735	−0.008890	0.029178	−0.022770
	(0.00669)	(0.04749)	(0.02874)	(0.10972)	(0.02571)	(0.02462)
	[0.80846]	[0.89438]	[1.90466]	[-0.08102]	[1.13497]	[-0.92469]

Table A.7: VAR model for Poland

	GDP	MILITARY	TAX	SOCIAL	DEBT	BROAD
GDP(-1)	0.476432	0.640344	1.057625	−0.530618	−2.442977	0.501034
	(0.36085)	(1.19769)	(1.32354)	(0.72074)	(2.28778)	(1.14472)
	[1.32030]	[0.53465]	[0.79909]	[-0.73621]	[-1.06784]	[0.43769]
GDP(-2)	−0.085355	−2.798761	0.019027	0.616527	1.763318	1.031019
	(0.28785)	(0.95541)	(1.05579)	(0.57494)	(1.82497)	(0.91315)
	[-0.29652]	[-2.92939]	[0.01802]	[1.07234]	[0.96622]	[1.12908]
MILITARY(-1)	−0.009184	−0.636597	0.431843	−0.001517	0.606594	0.078832
	(0.06552)	(0.21745)	(0.24030)	(0.13086)	(0.41537)	(0.20784)
	[-0.14018]	[-2.92750]	[1.79709]	[-0.01159]	[1.46037]	[0.37930]
MILITARY(-2)	−0.057056	−0.437912	−0.127485	0.091989	0.020330	−0.033813
	(0.07237)	(0.24019)	(0.26542)	(0.14454)	(0.45879)	(0.22956)
	[-0.78844]	[-1.82321]	[-0.48031]	[0.63643]	[0.04431]	[-0.14729]
TAX(-1)	0.147044	0.057367	0.865068	0.183578	0.489996	−0.056338
	(0.09554)	(0.31709)	(0.35041)	(0.19082)	(0.60570)	(0.30307)
	[1.53912]	[0.18092]	[2.46871]	[0.96205]	[0.80898]	[-0.18589]
TAX(-2)	−0.120814	0.267858	−1.025608	0.198162	−0.290235	−0.024973
	(0.13496)	(0.44793)	(0.49500)	(0.26956)	(0.85562)	(0.42812)
	[-0.89520]	[0.59799]	[-2.07194]	[0.73514]	[-0.33921]	[-0.05833]
SOCIAL(-1)	0.317997	−0.021790	2.166940	−0.341049	1.032693	−0.799224
	(0.20967)	(0.69591)	(0.76903)	(0.41878)	(1.32930)	(0.66513)
	[1.51665]	[-0.03131]	[2.81775]	[-0.81438]	[0.77687]	[-1.20160]
SOCIAL(-2)	0.108352	0.725601	−0.887175	−0.006303	−0.534141	0.568827
	(0.20647)	(0.68528)	(0.75728)	(0.41238)	(1.30899)	(0.65497)
	[0.52479]	[1.05884]	[-1.17152]	[-0.01529]	[-0.40805]	[0.86848]
DEBT(-1)	0.029391	−0.251134	−0.011277	−0.147922	−0.090443	−0.020214
	(0.05586)	(0.18539)	(0.20487)	(0.11157)	(0.35413)	(0.17719)
	[0.52618]	[-1.35460]	[-0.05505]	[-1.32588]	[-0.25539]	[-0.11408]
DEBT(-2)	0.048237	−0.216971	0.361124	−0.115151	0.098719	−0.074610
	(0.05562)	(0.18462)	(0.20401)	(0.11110)	(0.35265)	(0.17645)
	[0.86721]	[-1.17525]	[1.77008]	[-1.03649]	[0.27994]	[-0.42284]
BROAD(-1)	0.116201	0.467500	−0.567055	−0.237099	−0.637939	0.080461
	(0.11540)	(0.38303)	(0.42327)	(0.23050)	(0.73165)	(0.36609)
	[1.00692]	[1.22053]	[-1.33968]	[-1.02864]	[-0.87192]	[0.21979]
BROAD(-2)	−0.062805	−0.360938	0.359937	0.006860	0.270046	−0.026582
	(0.09418)	(0.31259)	(0.34544)	(0.18811)	(0.59710)	(0.29877)
	[-0.66685]	[-1.15465]	[1.04197]	[0.03647]	[0.45226]	[-0.08897]
C	0.002295	0.148148	−0.068828	0.061689	0.044843	0.020277
	(0.01831)	(0.06078)	(0.06717)	(0.03658)	(0.11611)	(0.05810)
	[0.12530]	[2.43728]	[-1.02467]	[1.68649]	[0.38622]	[0.34904]

Table A.8: VAR model for Turkey

	GDP	MILITARY	TAX	SOCIAL	DEBT	BROAD
GDP(-1)	−0.037329	−0.512994	−0.605581	−1.232509	−0.256129	−0.007480
	(0.23554)	(0.54384)	(0.40227)	(0.63754)	(0.87364)	(0.57172)
	[-0.15848]	[-0.94327]	[-1.50539]	[-1.93324]	[-0.29318]	[-0.01308]
GDP(-2)	0.117345	0.242448	0.009343	−0.487047	−1.248607	0.211963
	(0.24788)	(0.57234)	(0.42335)	(0.67095)	(0.91942)	(0.60168)
	[0.47339]	[0.42361]	[0.02207]	[-0.72591]	[-1.35804]	[0.35229]
MILITARY(-1)	−0.053148	0.016602	−0.114362	−0.246589	−0.201108	−0.321382
	(0.08463)	(0.19542)	(0.14455)	(0.22908)	(0.31392)	(0.20543)
	[-0.62798]	[0.08496]	[-0.79118]	[-1.07642]	[-0.64064]	[-1.56442]
MILITARY(-2)	0.019769	−0.087179	−0.154429	−0.418447	0.870001	0.141263
	(0.10161)	(0.23461)	(0.17354)	(0.27503)	(0.37688)	(0.24663)
	[0.19456]	[-0.37159]	[-0.88990]	[-1.52148]	[2.30846]	[0.57277]
TAX(-1)	0.042818	0.150074	0.314816	0.478511	0.204175	0.213575
	(0.13148)	(0.30357)	(0.22455)	(0.35587)	(0.48766)	(0.31913)
	[0.32567]	[0.49436]	[1.40200]	[1.34462]	[0.41868]	[0.66924]
TAX(-2)	−0.126563	−0.383870	−0.175245	−0.039232	0.049049	−0.281281
	(0.12340)	(0.28492)	(0.21075)	(0.33400)	(0.45769)	(0.29952)
	[-1.02566]	[-1.34730]	[-0.83153]	[-0.11746]	[0.10717]	[-0.93910]
SOCIAL(-1)	0.012283	−0.158463	0.144711	0.071210	0.398922	−0.074850
	(0.06946)	(0.16038)	(0.11863)	(0.18801)	(0.25764)	(0.16860)
	[0.17683]	[-0.98802]	[1.21981]	[0.37875]	[1.54836]	[-0.44394]
SOCIAL(-2)	−0.026446	−0.104561	0.005062	0.046994	−0.316457	−0.381849
	(0.06886)	(0.15899)	(0.11760)	(0.18638)	(0.25540)	(0.16713)
	[-0.38408]	[-0.65767]	[0.04304]	[0.25215]	[-1.23908]	[-2.28468]
DEBT(-1)	−0.056751	0.031951	−0.168969	−0.253677	0.120651	−0.053211
	(0.05890)	(0.13599)	(0.10059)	(0.15942)	(0.21845)	(0.14296)
	[-0.96358]	[0.23495]	[-1.67979]	[-1.59127]	[0.55229]	[-0.37221]
DEBT(-2)	0.086364	−0.160192	0.175432	0.130695	−0.072622	−0.126752
	(0.06156)	(0.14214)	(0.10514)	(0.16663)	(0.22834)	(0.14943)
	[1.40289]	[-1.12698]	[1.66853]	[0.78434]	[-0.31804]	[-0.84824]
BROAD(-1)	0.213272	−0.319113	0.214226	0.287793	−0.216163	−0.363618
	(0.09851)	(0.22745)	(0.16825)	(0.26664)	(0.36539)	(0.23911)
	[2.16499]	[-1.40297]	[1.27330]	[1.07933]	[-0.59160]	[-1.52070]
BROAD(-2)	−0.130567	−0.085186	−0.175596	0.008328	0.023195	−0.151628
	(0.08622)	(0.19908)	(0.14726)	(0.23338)	(0.31981)	(0.20929)
	[-1.51432]	[-0.42789]	[-1.19243]	[0.03569]	[0.07253]	[-0.72450]
C	0.044506	0.136290	0.075318	0.157186	0.094176	0.178046
	(0.02137)	(0.04934)	(0.03650)	(0.05784)	(0.07926)	(0.05187)
	[2.08269]	[2.76219]	[2.06367]	[2.71751]	[1.18816]	[3.43254]