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Does Neutrality Make a Difference? Explaining Patterns of Swiss Defense Spending in 1975-2001

by Thomas Bernauer, Vally
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Does Neutrality Make a Difference?

Explaining Patterns of Swiss Defense Spending in 1975-2001

Thomas Bernauer*, Vally Koubi** and Fabio Ernst***

Abstract

We study the behavior of defense spending in Switzerland in 1975-2001. Our main interest is in determining how neutrality in international affairs (non-membership in military alliances) affects defense spending. We find that neutrality is associated with a perception of lower levels of external threat; hence it confers economic benefits in the form of a smaller defense burden. However, neutrality does not fully insulate a country from variations in the level of external threat in the global system as perceived by members of military alliances. Swiss defense spending has tracked very closely the spending trends – but at a lower average level – of the United States and other NATO countries. To the extent post-Cold War threats, such as international terrorism, materialize primarily in the context of existing security alliances, Swiss military spending patterns observed in 1975-2001 are likely to remain the same in the future.

Keywords: defense spending, neutrality, alliances, threat, security, Switzerland

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Introduction

One of the main duties of every sovereign country is to protect its territory and people from violence emanating from other countries or from non-state actors such as terrorist groups. This duty can mainly be performed by means of military power. The cost of supporting military capabilities either during peacetime or conflict/war depends on both exogenous (such as geography, history and so on) and endogenous factors. An important factor from the latter group is a country's participation or non-participation in security or military alliances. Switzerland, a neutral country and therefore not a member of any security or military alliance, must to a great extent be self-reliant for its defense. Moreover, it does not have any formal obligation to take sides in international conflicts involving other parties. Swiss policy-makers must then perceive that the country is, relative to other countries, subject to a lower level of external threat.

In this paper we examine standard political and economic determinants of military spending in Switzerland. In addition, we seek to infer whether Switzerland's status as a neutral country makes her behave differently from other countries that belong to military alliances. We use the behavior of the defense budget to examine whether neutrality insulates a country from changes in the level of external threat in the global system.

We find that neutrality does alter defense spending but does not fully insulate a country from developments in the level of external threat in the global system as perceived by non-neutral countries. Switzerland's (and Austria's, a neighboring and also neutral country of similar size) average level of defense spending has remained systematically below that of Western European NATO members. However, at the same time, Swiss defense spending has followed the trend of spending in NATO countries. These two findings imply that the *level* of external threat perceived by neutral countries is indeed lower than that perceived by allied countries; that is, neutrality does confer savings in defense spending. Moreover, variation in

the level of external threat to alliance members, as expressed by their defense spending, is strongly positively correlated with variation in the level of external threats to neutral countries (again measured by their defense spending). Hence, neutrality does not fully insulate a country from global, alliance related risks.

The remainder of the paper is structured as follows. Section 1 offers a literature review. Section 2 presents the model. The empirical analysis is carried out in section 3, followed by a concluding section.

1. Review of Literature

Theoretical research

There is a substantial body of theoretical and empirical literature in political science and economics that seeks to explain defense spending. The theoretical explanations proposed so far can be classified into two categories: 1) arms races, and 2) organizational and bureaucratic politics¹. The arms race literature, following Richardson (1960), explains time-series patterns of military expenditure in terms of action-reaction behavior between two rivals who do not trust each other and disagree about the distribution of power in the international/regional system. The arms race model views the process of defense allocations as if it was the decision of a single rational individual influenced by three major factors: a) the military spending of the other nation (rival) in the threat system (the “reaction”, “defense” coefficient), b) the economic burden of paying for previous decisions to purchase military goods (the “fatigue

¹ Ostrom (1978) combines the arms races and organizational and bureaucratic politics approaches into a single model (the Reactive Linkage Model) to study US defense expenditures during the cold war era.

coefficient”), and c) the underlying grievances held by one nation against the other (the “grievance” coefficient)².

Although the arms-race model of military expenditure has been extensively explored, it seems that it is more suitable to analyze situations in which the countries involved are in conflict or are engaged in an enduring rivalry, such as the US-USSR cold war rivalry (Ostrom and Marra, 1986; Majeski, 1985), the Indian-Pakistani (Deger and Sen, 1990), the Arab-Israeli (Mintz et al, 1990), and the Greek-Turkish relationships (Kollias, 1995, 1996). In these cases the military preparedness of the other represents the overwhelming security issue/consideration. It should be mentioned though that there is no compelling empirical evidence yet to support the “action-reaction” hypothesis³.

The organizational and bureaucratic politics explanation views the government not as a unitary actor but rather as a “conglomerate of semi-feudal and loosely allied organizations, each with a substantial life of its own” (Allison, 1971, p.67) and in terms of all individuals involved in the decision making process. This model emphasizes “incrementalism” and bargaining over the defense budget, starting from the status quo. The basic idea of the organizational politics model is that the complexity of the decision-making process leads to the establishment of routinized practices (standard operating procedures, SOPs, or rules of thumb), which introduce a certain degree of predictability. In the context of defense spending this means that the best predictor of new increments to military spending is simply the increments of the immediate past; that is the main determinant of this year’s defense budget is

² This model, despite its theoretical parsimony, dynamic nature, intuitive plausibility, and popularity is subject to many types of criticism, for example, that it pays little attention to how actual decisions are made, and to the institutional procedures surrounding them.

³ See, for example, Kollias and Makrydakis, 1997; Georgiou et al, 1996; Correa and Kim, 1992; Deger and Sen, 1990; Cusack and Ward, 1981.

last year's budget⁴ (Correa and Kim, 1992; Kamlet and Mowery, 1987; Rattinger, 1975).

However, the constraints imposed by standard operating procedures may not apply directly to military spending, particularly in view of the significant influence that the main stakeholders in determining the defense budget (a prime minister/president, parliament, and the armed forces) can exert. Finally, the exclusion of the external threat/rivalry hampers their explanatory power.

Most of the theoretical literature in economics tends to ignore bureaucratic or political processes. It uses a standard neo-classical model in which a nation-state is represented as a rational agent who maximizes a welfare function depending on security and economic variables. This welfare function is subject to a budget constraint, which includes military spending and private consumption, and a security function, which determines the respective country's security in terms of its own and other countries' military forces. The country's government then balances the welfare benefits of extra security derived from military expenditure against its opportunity costs in terms of forgone civilian output. It solves this optimization problem to give a derived demand for military spending (Dunne and Perlo-Freeman, 2001; Avramides, 1997; Smith, 1995, 1989, 1987, 1980). Within this optimization framework, a wide variety of forms for the welfare function, budget constraint, and security function have been employed.

Empirical Research

Most empirical analyses, the large majority of which cover only the cold war era, take a comprehensive approach and combine all plausible economic, political and military factors that might influence defense spending. Some studies take a purely ad hoc approach to the

⁴ It should be kept in mind however, that optimizing models also suggest that the previous year's defense budget affects this year's defense budget.

empirical analysis. Others apply the reduced form equation that corresponds to the respective theoretical model of optimization⁵ where security is an integral component. Both approaches, however, lead to a similar estimation equation where the demand for military spending is a function of economic resources, threats to security as well as various domestic political factors and international contingencies. In other words, it is assumed that the defense spending of a country depends on income, usually its gross domestic product (GDP); the external threat the country faces, usually measured by the lagged military spending of the nation's rival(s); spill-ins, that is, the security provided by the military expenditures of the country's allies; domestic economic factors, such as the budget deficit, inflation, unemployment; political variables, such as the ideology of the political party in power and the electoral cycle; and dummy variables that capture environmental factors, such as the presence of war, the structure of the international system (hegemonic, bipolar, multipolar), and changes in strategic doctrine (e.g., Mutual Assured Destruction (MAD) and Flexible Response). Much effort, thus, is put into finding as efficient a set of variables as possible to measure the various components of the equation.

Most studies on the demand for military spending employ time-series analysis for individual countries. For example, Looney and Mehay (1990) estimated the demand for military spending in the USA; Correa and Kim (1992) in the USA and Soviet Union; Smith (1990) in the United Kingdom; Schmidt, Pilandon and Aben (1990) in France; Fritz-Assmus and Zimmermann (1990) in West Germany; Deger and Sen (1990) in India and Pakistan; Avramides (1997) in Greece. There are also a few cross-sectional studies (Dunne and Perlo-Freeman, 2001; Maizels and Nissanke, 1986; Dudley and Montmarquette, 1981). In all these studies explained variance (R^2) is quite high: that is, these models explain between 85 and 98

⁵ An alternative approach to optimization is the bureaucratic politics model mentioned above.

In empirical work both models lead to a similar estimation equation.

percent of the variation in defense spending. Yet, country studies have produced mixed results for the main determinants of defense spending. Thus, generalizations are difficult to make. Studying the determinants of defense spending in a neutral country like Switzerland is valuable in complementing the aforementioned research because it can help shed light on the issue of whether neutrality materially alters military spending and in what ways.

2. Model

The determinants (the optimal choice) of defense spending

Our statistical estimation will be loosely based on a simple framework that extends a model that has been extensively used in the literature to study the effects of military spending on economic growth (see, for instance, Ram, 1986) and to analyze the determinants of defense spending. We will assume that the government is benevolent in the sense that it selects the defense budget (and hence the level of national security) that maximizes non-military output. Alternative assumptions can easily be explored.

Let the economy consist of two sectors. The first sector produces a good called national security, S , according to the production function

$$(1) \quad S = S(M, E) \quad dS/dM > 0 \quad dS/dE < 0$$

M stands for goods and services produced through military spending, and E is the external threat faced by the country. For any given value of the defense budget, an increase in the level of external threat reduces the level of national security.

M is produced according to the process

$$(2) \quad M = M(K_m, L_m)$$

where K_m and L_m are the capital stock and level of employment used to produce M . The function M has the standard, neoclassical production properties.

The second sector, C , comprises the rest of the economy. It includes both civilian and government non-military goods. The distinction between civilian and government non-military goods can be introduced but at the cost of additional complexity.

$$(3) \quad C = C(K_c, L_c, S) \quad dC/dS > 0$$

where K_c and L_c are capital and employment in the rest (non-military sector) of the economy.

The idea behind this formulation is that national security is a vital input, which enhances the productivity of the factors of production. The effect of national security is modeled as an externality as far as the firms in the non-military sector are concerned.

Using (1) and (2) in equation (3) produces

$$(4) \quad C = C[K_c, L_c, S(M(K_m, L_m), E)]$$

Taking the derivative of C with regard to K_c and L_c and setting them equal to zero yields the optimal choices of K_c and L_c and hence of K_m and L_m and the defense budget.

$$(5) \quad dC/dL_c = (dC/dS)(dS/dM)(dM/dL_m)$$

$$(6) \quad dC/dK_c = (dC/dS)(dS/dM)(dM/dK_m)$$

where we have used the fact that for a given labor force, L , $dL_m/dL_c = -1$.

Again assuming that the marginal productivity of any factor of production is the same across the two sectors results in

$$(dC/dS)(dS/dM) = 1$$

which can be rewritten as

$$(7) \quad M/C = n_{cs}n_{sm}$$

or in terms of the defense share in output as

$$(8) \quad M/Y = n_{cs}n_{sm}/(1 + n_{cs}n_{sm})$$

Equation (8) indicates that military spending is an increasing function of C (and hence of total output).

To gain more insights into the properties of (8) we will use a specific example that abstracts from labor. This particular example will show how the optimal share of defense spending in GDP varies as a function of the level of external threat.

Let

$$(9) \quad C = aK_c + S^b$$

$$(10) \quad S = M - gE$$

$$(11) \quad M = fK_m$$

with a , b , f and g being positive constants.

Use (10) and (11) in (12) and also the fact that $K_m + K_c = K$. Then taking the derivative with regard to K_c and setting it equal to zero leads to the following equation

$$(12) \quad K_c = K - (g/f)E - [(a/b)^{1/(b-1)}] / f$$

Hence $dK_c/dE = -g/f < 0$. An increase in the level of external treats redirects resources towards the military sector, thus increasing the optimal share M/Y .

3. Data and Empirical Analysis

Equation

Our empirical analysis of the demand for defense spending in Switzerland will be based on the implementation of equation (12) by running a regression of the type

$$M = h_1 + h_2*Y + h_3*E + u$$

where defense spending (M) depends on domestic economic conditions (Y) – such as real GDP growth, the unemployment rate, and the federal budget deficit to GDP ratio – and the external threat (E). u is the error term. We also include lagged values of defense spending (M)

to capture “organizational/bureaucratic inertia” in defense outlays. The data for Swiss defense spending was provided by the Swiss Defense Ministry. It covers the time-period 1975-2001. We limit the dataset to this time-period because the terrorist attacks in the United States in September 2001 as well as the subsequent wars in Iraq and Afghanistan have led to the decoupling between defense spending in the USA and other countries. This is probably due to the fact that these events have been perceived as representing US specific developments and may not carry implications for the defense situation of other countries. We present information on post 2001 developments in defense budgets later on. The data on the other variables were compiled by the authors from open sources (see Appendix).

Switzerland is a neutral country. An important question is, therefore, whether perceptions of threats emanating from the international system and the type of relations among major powers in this system influence Swiss defense spending decisions in the same way they influence such decisions in countries that are not neutral. If they do, then one can argue that neutrality does not by itself alter fundamentally the defense spending process.

Results

We examine three types of potential driving forces:

- a) organizational and bureaucratic politics or path-dependence (inertia)
- b) the external security environment
- c) domestic economic factors

(a) Organizational and bureaucratic politics or Path-dependence (inertia)

We begin by examining the degree of inertia in Swiss defense spending by estimating the equation

$$DS(t) = a * DS(t-1) + \varepsilon$$

Inertia (path dependence) means that national defense spending choices at time t have a strong influence on the same type of choices at time $t+1$. Table 1 summarizes the results.

Insert Table 1 about here

It indicates that the Swiss defense burden is highly persistent (autoregressive coefficient of 0.98). Moreover, this model has much explanatory power .85 percent of the Swiss military burden in a given year is explained by the military burden in the previous year.

(b) External security environment

If threats emanating from the international system affected mostly those countries that are directly involved in this system (through participation in rivaling alliances) one should expect that the defense burdens of alliance members would not matter for a neutral country like Switzerland. Yet, if external threats affected alliance members and neutral countries alike then one should expect to see a positive covariation of the defense budgets in allied and non-allied countries. If the nature of external threats in the international system were of the latter variety, then one could *not* claim that neutrality is a means of achieving savings in military spending. In that case, defense spending in neutral countries would simply mimic such spending in non-neutral countries; in other words, one would not be able to argue that neutrality shelters a country from the cost of arms races in the international system.

To infer the type of perceptions regarding the nature of external threat (alliance specific or general) we examine the effects of defense expenditures in other countries on Swiss defense spending. Figure 1 depicts the time path of US and Swiss real defense spending 1975 - 2001 (as we mentioned above, we end with 2001 in order to abstract from the effects of 9/11 on US military spending). Both series have been normalized by dividing them with

their 1975 levels (so they both have the same initial value, which makes it easier to detect divergence in spending across countries).

Insert Figure 1 about here

The similarity of the two paths is quite remarkable. Swiss defense spending has tracked very closely that of the United States. Our interpretation of this finding is that there exists a global threat of conflict, to which the US responds and/or contributes. This global threat is not fully alliance specific. That is, Switzerland must have expected that if there were a conflict between NATO and the Eastern Block, there would be spillover effects; hence it let its military spending vary with the perceived level of that external threat. Table 2 confirms this interpretation in the context of standard regression analysis.

Insert Table 2 about here

Figure 2 and Table 3 offer more support for this claim. Figure 2 depicts the paths of defense burdens (military spending as a percentage of GDP) of the four largest NATO countries and two neutral countries (Austria, Switzerland). Table 3 shows the correlation coefficients for defense spending of the four largest NATO countries and two neutral countries (Austria and Switzerland) in 1975-2001.

Insert Figure 2 about here

Insert Table 3 about here

Two important patterns become evident. First, the covariation of the Swiss defense burden with the defense burdens of other countries is very high. The defense burdens in 1975 - 2001

of Switzerland, four key NATO countries (USA, UK, France, Germany), and another neutral European country (Austria) have all moved in tandem. They reached a peak in the early-to-mid 1980s and have declined since. The second important pattern is that, as shown in Figure 2, the four listed NATO countries exhibit consistently higher defense burdens than Switzerland (and also Austria).

What conclusion can be drawn from these two findings? As argued above, it seems that perceptions of external threats to European countries do not seem to be a function of a country's international alliance membership *exclusively*. That is, neutrality does not *fully* spare a country from external threats in a world of major alliance rivalry. However, the *level* of such threats seems to be lower for neutral countries, that is, there appear to be cost savings associated with neutrality. The fact that this finding applies equally to Austria (which has borders with two alliance groups, see Table 4) and Switzerland (which is surrounded by countries belonging to a single alliance) indicates that the critical issue is indeed international status (neutrality) rather than location.

Insert Table 4 about here

(c) Domestic economic conditions

We have also examined the effects of a wide range of domestic economic conditions on year-to-year Swiss defense allocations, most notably, economic growth, unemployment, and federal government deficit. Table 5 shows our key results (identical results obtain when we use data from 1975 to 2005).

Insert Table 5 about here

Neither economic growth nor the unemployment and budget outlook have had a significant effect on Swiss defense spending. More generally, we have experimented with additional variables representing domestic economics conditions without altering this result. We conclude that Swiss policy-makers do not use defense spending for short run macro-economic purposes.

4. Conclusion

Our analysis shows that defense spending in Switzerland responds to the level of external threat as perceived by the large NATO countries. In the recent past, the main external threat was the Soviet Union. It appears that the distribution of this threat across NATO and non-NATO countries must have had alliance-specific as well as global components. The alliance-specific component can be seen in the fact that Switzerland was able to keep defense spending substantially lower than the NATO countries. While one could argue that lower defense spending by Switzerland reflected free-riding on the containment policies of the United States and NATO, an alternative plausible explanation is that neutrality is indeed associated with a lower level of external threat. This explanation has the advantage that it accounts for participation in alliances in an endogenous fashion. Countries that face a lower level of external threat chose both a lower level of defense spending and non-participation in a military alliance.

What are the likely security threats to Switzerland (and other neutral countries) in the future? The most likely threat, given developments in the past five years, seems to be international terrorism. To the extent this threat materializes primarily in the context of existing security alliances (for instance, the United States and its allies versus Islamic fundamentalists), Swiss military spending patterns observed in 1975-2001 are likely to remain the same in the future. To the extent that new threats (whether they emanate from terrorism or other sources) become more diffused (that is, less alliance specific) there will be a greater

need for Switzerland to look after itself. In the latter case, neutrality may no longer carry the advantages it did in the past. This would result in higher defense spending. However, there is no evidence so far that policymakers outside the US (and the UK) perceive terrorism-related threats as becoming more diffused. This confirmed from inspection of Figure 3, which reports defense spending (as a percentage of GDP) following the 2001 terrorist attack in the US. As can be seen, the growth of defense spending in the US has increased considerably since 2001 (and to a significant but smaller degree in the UK) while that in the other countries has remained flat. Of course, the period is too short to allow inferences about the future. But the observed defense patterns seem to support the view that the perception outside the US and the UK regarding the Islamic terrorist threat is that it remains—at least for the time being— a US-UK affair.

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Table 1: Path dependence of Swiss defense spending, 1975-2001

Dependent variable: Swiss defense spending (% of GDP)

Method: Least squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHDS _{t-1}	0.983	0.082	11.55	0.000
Cons	0.014	0.128	0.110	0.917

R-squared	0.854
Adjusted R-squared	0.848
Durbin-Watson stat	2.100
F-statistic	140.46
Prob(F-statistic)	0.0000

Table 2: External threat, 1975-2001

Dependent variable: Swiss defense spending (% of GDP)

Method: Least squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
USADS	0.5145	0.2526	2.0365	0.0534
C	0.1536	0.0655	2.3444	0.0281
AR(1)	0.6717	0.1791	3.7511	0.0010

R-squared	0.8013
Adjusted R-squared	0.7840
Durbin-Watson stat	1.8709
F-statistic	46.372
Prob(F-statistic)	0.0000

Table 3: Cross country correlations of defense spending (% of GDP), 1975-2001

	Switzerland	USA	Germany	France	UK
Switzerland	1.0000				
USA	0.9038	1.0000			
Germany	0.8205	0.7992	1.0000		
France	0.8665	0.7761	0.8649	1.0000	
UK	0.9106	0.8504	0.9663	0.8947	1.0000
Austria	0.8603	0.8079	0.8554	0.8307	0.8734

Table 4: Austria's defense spending, 1975-2001

Dependent Variable: Austrian defense spending (% of GDP)
Method: Least squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
USADS	0.132736	0.031043	4.275876	0.0003
C	0.453384	0.146124	3.102742	0.0050
AR(1)	0.448108	0.180662	2.480369	0.0209

R-squared	0.72591
Adjusted R-squared	0.70208
Durbin-Watson stat	1.82470
F-statistic	30.4583
Prob(F-statistic)	0.00000

Table 5: Domestic economic effects on Swiss defense spending

Dependent Variable: Swiss defense spending (% of GDP)

Method: Least squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHDS _{t-1}	0.844762	0.142432	5.930986	0.0000
GDP_GR _{t-1}	-0.007148	0.012066	-0.592413	0.5602
UNEMPL _{t-1}	-0.030885	0.017490	-1.765797	0.0927
DEBT _{t-1}	0.000790	0.007376	0.107137	0.9157
C	0.273817	0.319335	0.857460	0.4013

R-squared	0.886186
Adjusted R-squared	0.863423
Durbin-Watson stat	2.310509
F-statistic	38.93123
Prob(F-statistic)	0.000000

Figure 1
Defense spending in Switzerland and the USA (% of GDP)

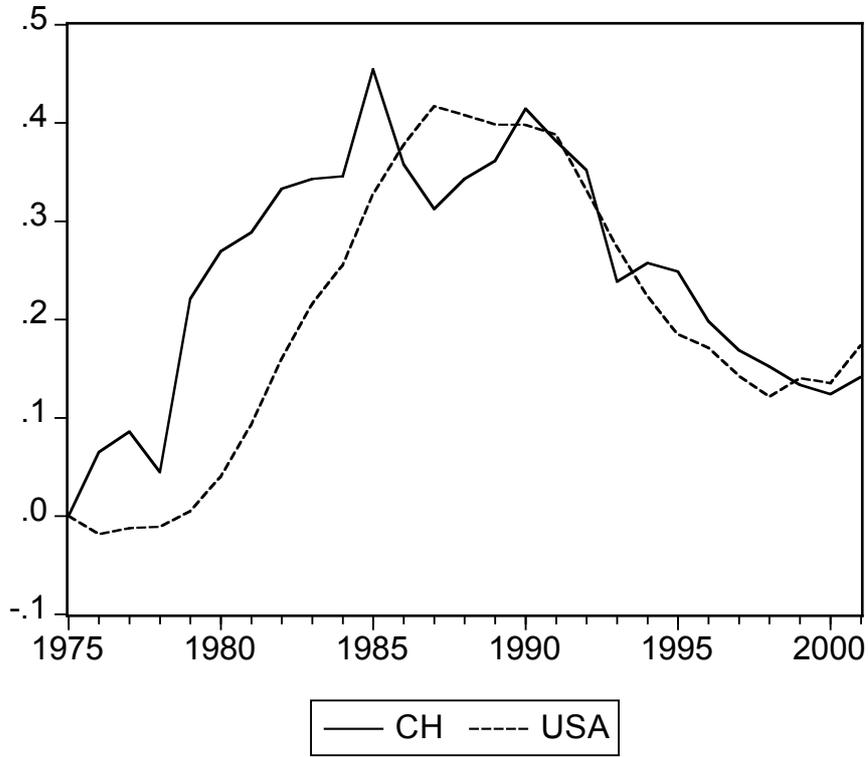


Figure 2
Defense to GDP ratio in Switzerland, Austria, France, Germany, UK, USA, 1975-2001

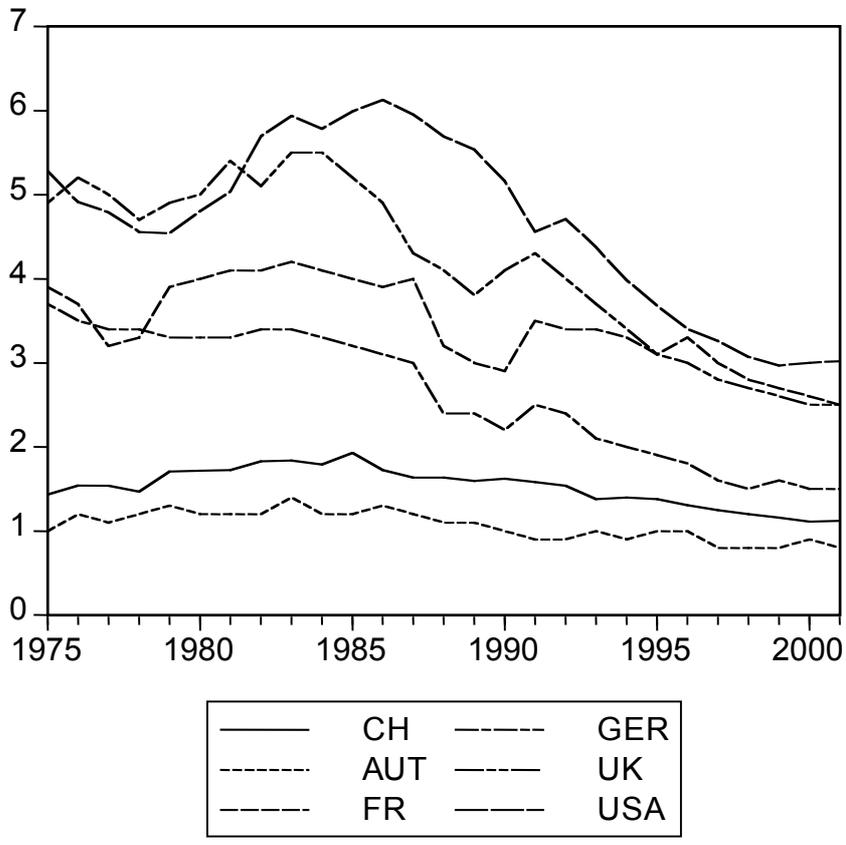
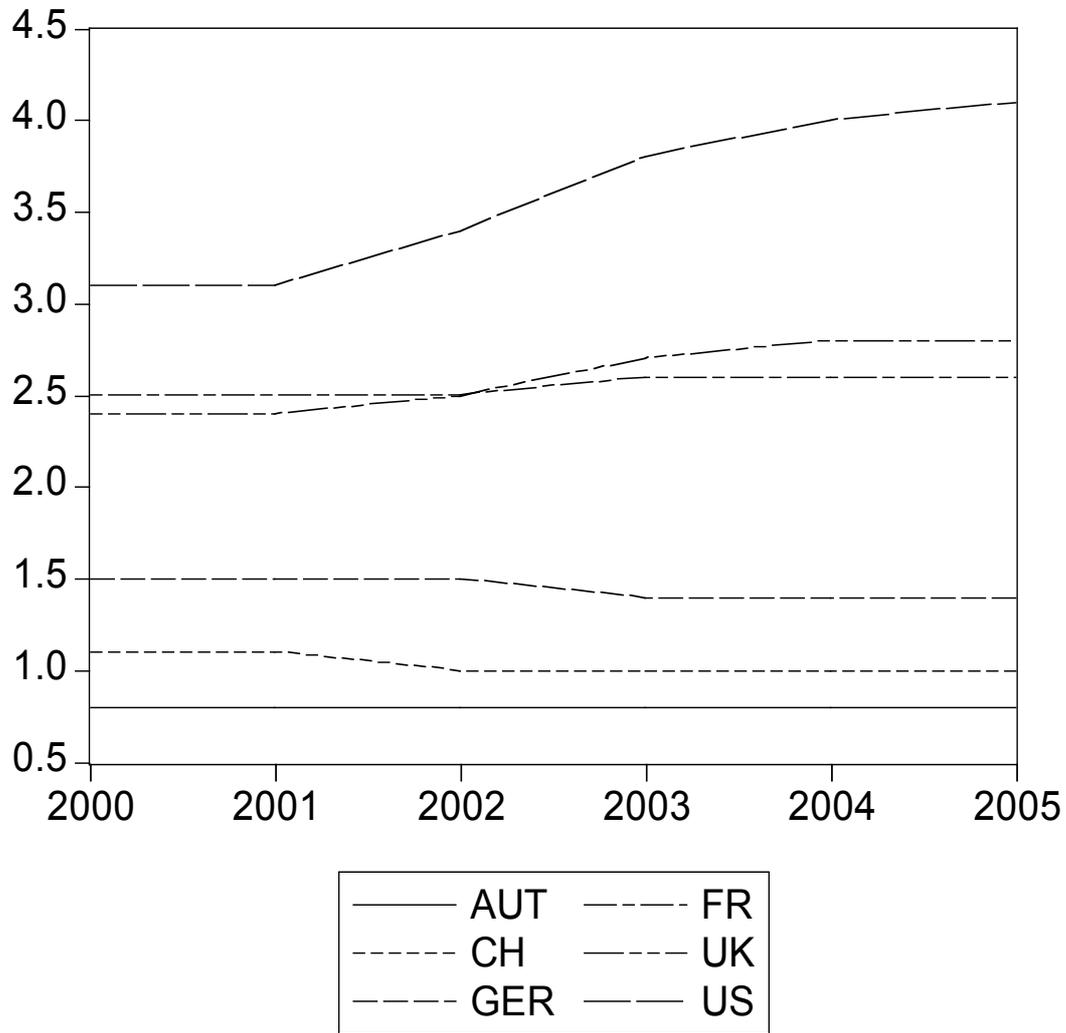


Figure 3
Defense to GDP ratio in Switzerland, Austria, France, Germany, UK, USA,



2000-2005

Appendix

Variable	Description	Source
AUTDS	Defense spending of Austria as % of GDP	Military Balance and SIPRI
FRDS	Defense spending of France as % of GDP	Military Balance and SIPRI
GERDS	Defense spending of Germany as % of GDP	Military Balance and SIPRI
CHDS	Defense spending of Switzerland as % of GDP	Swiss Defense Ministry
DEBT	Swiss federal government debt, current CHF	Swiss Finance Ministry
GDP_GR	Real GDP growth in Switzerland	Swiss Statistical Office
UNEMPL	Unemployment rate in Switzerland	Swiss Statistical Office; Comparative Political Data Set (http://www.ipw.unibe.ch/mitarbeiter/armingeon/default.asp?inhalt=CPD_St)
UkDS	Defense spending of United Kingdom as % of GDP	Military Balance and SIPRI
USADS	Defense spending of the USA as % of GDP	Military Balance and SIPRI