Budget Rules and Defense:
Evidence from the EU

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ABSTRACT: I investigate whether the debt limits imposed by the Stability & Growth Pact affected defense spending, using three occasions on which changes in defense spending would be expected to occur: the 1999 adoption of the SGP, the 2001 War in Afghanistan and the 2003 War in Iraq. I find that deficit constraints have a negative and statistically significant association with defense spending, on the magnitude of 0.2-0.4% GDP. Use of the 1990 Gulf War as a placebo treatment when the SGP did not exist suggests that the same group of countries react to similar circumstances in a different way in the presence of the SGP than they do in its absence.

[0]I am grateful to Martin Feldstein, Alexander Gelber, Naomi Hausman, Giacomo Ponzetto, and Gokce Ozbilgin for extremely helpful comments and criticism. THIS IS AN EXTREMELY PRELIMINARY VERSION: DO NOT REFERENCE WITHOUT PERMISSION.

1 Introduction

Adam Smith suggested that since public debt facilitates war, limiting it will reduce war:

> "Were the expence of war to be defrayed always by a revenue raised within the year ... wars in general would be more speedily concluded, and less wantonly undertaken. The people feeling, during the continuance of the war, the complete burden of it, would soon grow weary of it, and government, in order to humour them, would not be under the necessity of carrying it on longer than it was necessary to do so. The foresight of the heavy and unavoidable burdens of war would hinder the people from wantonly calling for it when there was no real or solid interest to fight for." (1776, pp. 584-585)

In this paper I aim to empirically evaluate this hypothesis and suggest why it might hold. I utilize the budget rules imposed by the Stability & Growth Pact, which constrain Eurozone governments' ability to issue public debt, as a natural experiment to investigate the effect of such rules on defense spending. I find a strongly negative and statistically significant association of the Pact with defense spending.

Such an empirical relationship might hold for two reasons. First, as Smith explains, if a country cannot issue public debt, then it cannot defer into the future the costs of raising money for defense. Such a government will have to pay the full sum upfront, which requires politically unpopular sharp rises in taxes, instead of delaying payment to a future which is discounted relative to the present.

Second, such budget rules combined with a sudden spike in defense spending would force a government to violate the principle of optimal tax smoothing, which was first explored by Barro (1979) and derived in different settings by Kydland and Prescott (1980) and Lucas and Stokey (1983). The traditional tax smoothing model treats wars as exogenous, sudden, large expenditures which the government can finance by optimally setting taxes and deficits to raise revenue.

In Barro's result, the optimal policy is to set the same level of taxes in each period. If the distortions from taxes are convex and increasing, they can be minimized by spreading the tax base across time as evenly as possible. Doing so takes advantage of the flat part of the cost function: tax levels are

smoothed over time and the sum of distortions minimized. As a result, if government must finance a sudden, unexpected and large expenditure like a war, deficits should adjust to keep tax rates constant. Wars should be financed with public debt. Tests of the original tax smoothing hypothesis have been performed by Barro (1979), Huang and Lin (1993), and Ghosh (1995).

Instead, consider a world in which there are limits to public debt. If a country needs to increase its defense spending, it will have to finance it entirely through taxes. This restriction will cause defense to be more expensive because the economy will suffer higher distortions on whatever economic activity is taxed. As most governments who have signed the SGP already impose high tax rates, the marginal excess burden of another rise in taxes will be significant. If the cost of defense goes up, the government will be more war-averse. Thus another implication of the tax smoothing proposition is that if there are exogenous limits to debt accumulation, countries with different abilities to accumulate debt will be willing to spend different amounts on defense.

Economic analysis has yielded a small literature on the determinants of war and defense spending. On the theoretical side, Alesina and Spolaore (2005, 2006) study war and defense spending decisions in the context of country size, country quantity and superstate break-up, and Glaeser (2006a,b) studies the political economy leading to decisions to go to war. On the empirical side, Alesina, Easterly and Matuszeski (2006) study conflict in the context of the degree of artificiality of state borders; Matuszeski and Schneider (2006) examine the relation between ethnolinguistic diversity and civil war; and Miguel, Satyanath and Sergenti (2004) use a rainfall instrumental variables approach to study the impact of economic growth on the decision to go to war. These papers differ from mine in that these authors have looked at the impact of country geographic and cultural structure on conflict, whereas in this paper I examine the impact of a relative price change due to budget rules. There is of course a large non-economic literature.

I proceed as follows. In section two I discuss the relevance of the Stability & Growth Pact (SGP) to recent budgetary trends in Europe. In section three I use the budget rules imposed by the SGP to study the effect of fiscal constraints on defense spending. Evaluating the SGP as a treatment I find it has a negative and statistically significant association with defense spending in times of conflict. Being bound by the SGP is associated with a 12-25% smaller defense share of GDP, or on average, 0.2-0.4% of GDP. I also use

the 1990 Gulf War, when the SGP did not exist, as a placebo event to test whether the countries which ultimately signed the SGP react similarly in its absence; the results of this test suggest that the SGP was in fact responsible for the difference. Section four considers policy implications and concludes.

The conclusion I draw from these results is that recent European pacifism is at least partially due to changes in prices. Such a hypothesis is straightforwardly testable, while a change in relative preferences is not. As anecdotal evidence, consider that precisely those countries on the SGP have had the most vocally anti-war leaders, while the European countries which have most aided the USA in its recent wars—the UK, Poland, Italy—are not bound by the SGP.[1]

2 Empirics

2.1 Relevance of the Stability & Growth Pact

The theoretical considerations in the introduction imply three testable hypotheses:

1. When defense becomes more important, expenditures should increase. We might expect to see deficit-bound countries increase their defense spending by less than other countries. Following the events of September 11, 2001, the world became more aware of the threat of terrorism and defense spending became more valuable; such reasoning predicts that SGP-bound countries would increase defense spending by less than unbound countries.

2. When a fiscal constraint is first imposed, we might expect to see the defense activity of the affected countries decrease relative to the war activity of the unaffected countries.

[1] Italy is a Eurozone member and officially signed the SGP. However as I discuss in section two it is nowhere near the margin of violation where a little more debt would push it into breaking the SGP—it has been about twice over the limits for years. The SGP is thus not a binding constraint for Italy the way it is for Germany, which recently decided to raise its VAT in order to avoid violating the Pact. There was in fact some debate as to whether Italy should be allowed to adopt the Euro given its reckless fiscal history, but it was ultimately welcomed into the currency union in the spirit of European solidarity.

3. The volatility of defense spending within countries bound by the SGP should be lower than it is in other countries in the period after which the SGP takes effect.

These predictions can be investigated by exploiting as a natural experiment the advent of the Stability & Growth Pact. The SGP grew out of Articles 99 and 104 of the 1992 Maastricht Treaty. It was signed in 1997 as a prelude to the Euro currency and took effect on January 1, 1999. The Pact limits signatory countries to deficits of 3% annual GDP and debt of 60% GDP, in order to contain the effects of local fiscal policy. Without it, the externalities of fiscal policy in, say, Germany, could harm Portugal through the interest rate mechanisms of the shared currency and monetary policy. The SGP makes the Euro viable as a shared currency for many different countries and fiscal policies.

Figure 1 makes evident the attempts of most of the Eurozone countries to stay within the bounds of the SGP; the flattening or downward trends in debt levels reflect attempts to reduce the debt-to-GDP ratio; data are from the OECD *Economic Outlook* (2006). Most of the Eurozone governments appear to take the Pact seriously.

Figure 1 suggests that the only flagrant violators are Italy and Belgium. Belgium seems more genuinely concerned with meeting the SGP criteria, as indicated by the downward trend in its debt level and its large budget surpluses; Italy seems content to hover far beyond acceptable levels, sometimes twice the limit. Further evidence that the majority of these countries take the SGP seriously is given by the fact that Germany recently planned to raise its value added tax by 3%, to a new level of 19%. The explicit reason, according to Chancellor Angela Merkel's government, is "to help reduce the budget deficit to below the European Union limit of 3% of GDP" (BBC 2006). These facts suggest that a sudden expense would be a troublesome proposition for all the countries but Italy, which does not seem to care about large deficits; indeed Italy has been the third largest contributor to the coalitional forces in Iraq after the United States and United Kingdom.

The SGP also arrived at a time when military activity increased after the relatively placid 1990s: in 2001 the World Trade Center was destroyed and the US began fighting worldwide terrorism with unprecedented ardor; and in 2003 a coalition of countries invaded Iraq to eliminate the threat posed by Saddam Hussein. After the events of late 2001 the world became aware of international terrorism in a way in which it had previously not been and

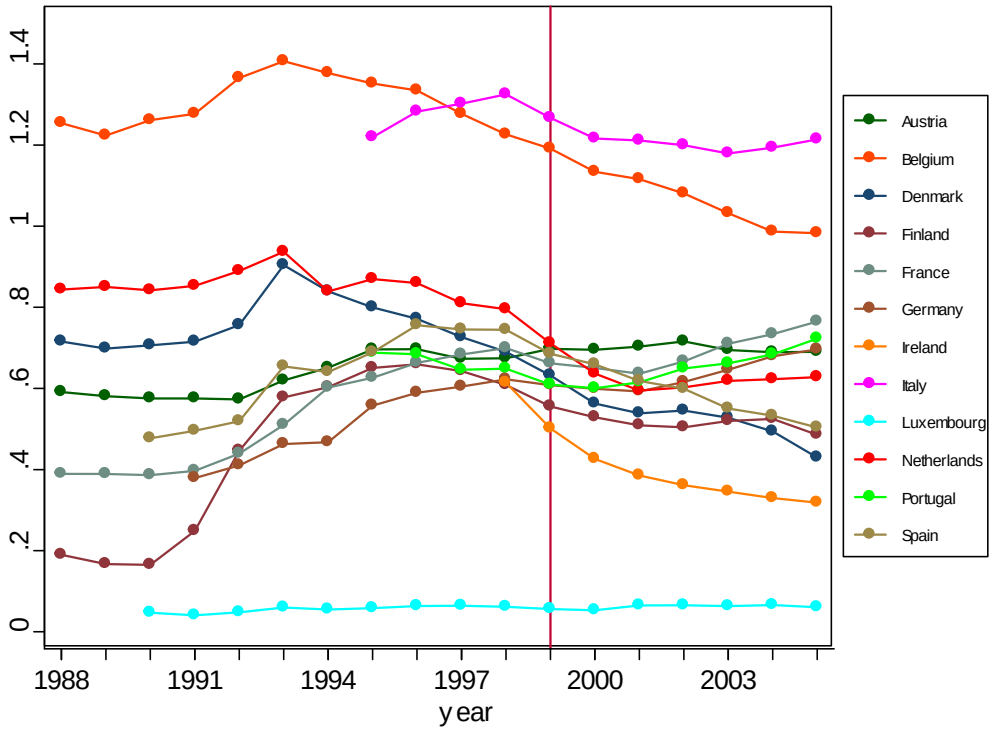

Figure 1: Debt shares in SGP countries; vertical line corresponds to SGP taking effect in 1999.

the global value of defense spending rose with the new security needs. The previous hypotheses can be tested by looking at how the defense spending of Europe has developed over the last decade.

Figure 2 displays the average defense shares for the SGP and non-SGP countries, and Table 1 reports summary statistics for real GDP in 1990 dollars and its growth rate, whether a country is a member of NATO in a given year, whether a country receives military aid from the USA, and defense and government shares of GDP. It is easy to see that for most of the pre-1999 era the defense shares, although off by a steady amount, move similarly. After 1999, when the Pact comes into effect, the comovement seems to drop off. Regression analysis in the next section bears this out.

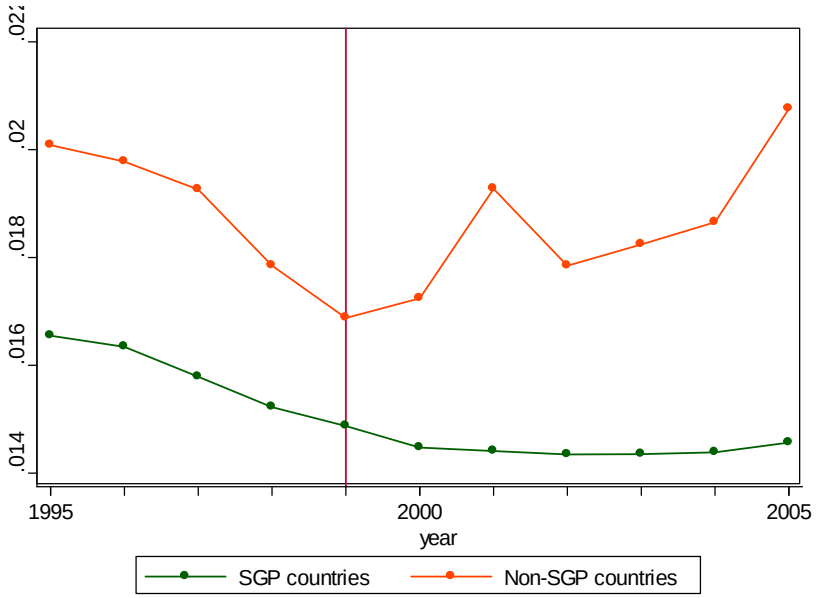

Figure 2: Average defense shares in SGP and non-SGP countries; vertical line corresponds to the SGP taking effect in 1999.

TABLE 1: Summary Statistics, 1995-2005

	Full sample				Treatment group				Control group			
	mean	s.d.	min	max	mean	s.d.	min	max	mean	s.d.	min	max
GDP	.290	.465	.001	2.18	.577	.648	.015	2.18	.168	.282	.001	1.41
Growth rate	.034	.033	-.22	.121	.029	.022	-.01	.117	.037	.036	-.22	.121
Military aid	.543	.499	0	1	.174	.381	0	1	.701	.458	0	1
NATO member	.373	.484	0	1	.667	.473	0	1	.247	.432	0	1
Govt. share	.189	.044	.086	.332	.189	.031	.124	.251	.189	.049	.086	.332
Defense share	.018	.010	.001	.075	.015	.006	.006	.030	.019	.011	.001	.075

2.2 Econometric Strategy

I test the hypotheses for countries bound and not bound by the Stability & Growth Pact by investigating the effect of the SGP on the share of GDP devoted to defense spending for a panel of 40 countries, 12 of which are deficit-constrained.[2] To test each of the three hypotheses I use a difference-

[2]The countries I consider constrained are those originally bound by the Stability & Growth Pact: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg,

in-differences methodology, interpreting the SGP as a treatment.

For the first two hypotheses I investigate three separate treatment effects. In 1999 we might expect defense spending to decrease because of the sudden budget rules imposed by the Stability & Growth Pact. In 2001 we should expect defense spending to increase due to sudden awareness of the threat of terrorism brought about by the events of September 2001 and the invasion of Afghanistan; however theory predicts that spending will increase more in unconstrained countries than it will in constrained countries. Finally in 2003 we should expect defense spending to increase (again, more for unconstrained than constrained countries) due to the believed threat of weapons of mass destruction in Iraq.

Formally, to investigate the first two hypotheses I run the regression:

$$defshare_{i,t} = \alpha + \beta_1 after_{i,t} + \beta_2 after_{i,t} \cdot SGP_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}$$

where $defshare_{i,t}$ is the natural logarithm of share of GDP spent on defense in country i during year t; $after_{i,t}$ is a dummy variable indicating whether the year is after one in which I expect a change in defense activity to occur (for example, for the war in Afghanistan it is set to 0 in all years before 2001 and 1 for 2001 forward; the dummy functions similarly for the treatment dates of the SGP signing in 1999 and the Iraq war in 2003); $SGP_{i,t}$ is a dummy variable indicating whether country i signed Stability & Growth Pact; and $X_{i,t}$ is a vector of control variables. $X_{i,t}$ consists of country-specific fixed effects, the government sector's share of GDP; trillions real GDP; and dummy variables indicating whether the country was a member of NATO, whether the country was along the border of the Iron Curtain, and whether the country received military aid from the United States.[3] Popular opinions of the USA during the year 2002 are included in a separate set of

Netherlands, Portugal and Spain. I also consider Denmark constrained because since 1999 it has been in the ERM II, meaning it has been bound by the same fiscal constraints as the others in anticipation of adopting the Euro. As control countries I selected other European countries and some other G7 nations for whom reliable data were available: Australia, Belarus, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Macedonia, Malta, Moldova, New Zealand, Norway, Poland, Romania, Russia, Serbia & Montenegro, Slovak Republic, Slovenia, Sweden, Switzerland, Turkey, UK, and Ukraine. I exclude Greece from the sample because it adopted the Euro in 2001, which raises endogeneity concerns along the lines discussed in section 2.3.

[3] I run all regressions both with and without country-specific trends in $X_{i,t}$. In most cases, detrending the data (either by fitting a quadratic trend and subtracting the fitted values from the reported values, or by running the data through a Hodrick-Prescott filter

regressions but do not substantially alter the results, so I do not report them.[4] I run this regression three times, for the three separate occasions on which I expect there to be important differences driven by the SGP: 1999, 2001 and 2003. I also run regressions with all combinations of the three treatments in the same equation to determine the marginal effect of later treatments when earlier ones are accounted for.

I estimate the log of the defense share of GDP because the variation within Europe is slight and because I am interested in how defense spending changes in response to institutional and international developments, so logs allow me to interpret the regression results as growth rates. I do perform regressions where I take the share itself as the dependent variable; the coefficients are similar, but only marginally statistically significant at 10% and sometimes not significant at all; I do not report these.

The coefficient of interest is the difference-in-differences estimator β_2 and captures whether or not the Stability & Growth Pact had an effect on countries' defense spending once effects for time and fixed effects for each country are removed.

I also run a regression to examine the year-by-year changes in spending:

$$defshare_{i,t} = \alpha + \sum_{t \in T} \beta_t year_{i,t} + \sum_{t \in T} \delta_t year_{i,t} \cdot SGP_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}$$

Here $year_{i,t}$ is a dummy variable equal to one for year t and zero for all other years. T is the set $\{1995, ..., 1997, 1999, ..., 2005\}$ such that 1998 is the omitted year; such a decision forces the regression to compare the treatments to the discontinuity right when the SGP takes effect. The β coefficients remove fixed effects for each year, and the X variables are the same as before. In this regression $\{\delta_{1999}, ..., \delta_{2005}\}$ are the coefficients of interest.

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to isolate the trend and then subtracting that from the reported values) has similar results to the regressions on raw data controlling for country-specific trends.

[4] I report results only without this variable since data are not available for many countries; when I use it, the sample is reduced to Bulgaria, Canada, Czech Republic, France, Germany, Italy, Japan, Poland, Russia, Slovak Republic, South Korea, Turkey, UK, and USA. Inclusion of this variable does not alter the sign of the key coefficients, but makes them marginally insignificant at 10% significance. Running the same regression without the opinion variable on the reduced sample yields virtually identical results to running the regression with the opinion variable, suggesting that the loss of significance is due to the sampling problem. Opinion data come from the Pew Global Attitudes Survey (2003).

Finally, to investigate the third hypothesis above, I run the regression

$$sd_{i,t} = \alpha + \beta_1 after_{i,t} + \beta_2 after1999_{i,t} \cdot SGP_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}.$$

The fixed effects and controls are the same as before, with the additional control of the defense share, which is now in $X_{i,t}$. $sd_{i,t}$ is the standard deviation of the defense share between 1993-1998 for years from 1993 up to the signing of the Pact, and the standard deviation of the defense share between the years 1999-2005 for the years after the signing of the pact, scaled by the average defense share in that period for country i. Again, β_2 is the coefficient of interest; it is the difference-in-differences estimator for the volatility of proportional defense spending. β_2 picks up any effects on volatility beyond those due to time and fixed differences between SGP and non-SGP countries.

As a final robustness check, I run a difference-in-differences-in-differences regression, using the 1990 Gulf War as a placebo event. With Saddam Hussein's invasion of Kuwait, it would be natural to expect defense expenditures to change in most countries. However, the SGP did not yet exist so we can view the Gulf War as a placebo treatment, to see whether the Eurozone countries reacted differently to the second conflict in the Middle East than they did to the first. The Gulf War is a good placebo treatment because the circumstances in 1990 and 2001 were similar: a Western country or ally was attacked, and a coallition of Western forces sent troops into the Middle East in its defense, to right the situation as it thought best.

For this exercise I take advantage of the full SIPRI dataset, which ranges from 1988 to 2005, and treat the observations from 1988-1996 as a different set of countries. For these placebo countries, I renumber the years so that 1990, the year in which the Gulf War took place, coincides with 2001, the year in which the fighting in Afghanistan began, and which, as I discuss in section 3, seems to be the strongest of the three effects. The sample now includes, for example, Austria1 with observations 1996-2005, and Austria2 with observations 1988-1995 (renumbered as 1999-2007, so that the third observation corresponds to the year of conflict). This renumbering allows me to isolate the effect of the SGP on the treated countries, taking into account differences that existed in similar conditions of fighting.

The difference-in-differences-in-differences is equal to

$$\begin{aligned} DDD &= [(def_{SGP,after,1} - def_{SGP,before,1}) - (def_{control,after,1} - def_{control,before,1})] \\ &\quad -[(def_{SGP,after,0} - def_{SGP,before,0}) - (def_{control,after,0} - def_{control,before,0})], \end{aligned}$$

where the subscript 1 corresponds to the experimental (post-1996) countries and the subscript 0 corresponds to the placebo countries. DDD can be calculated by estimating the regression

$$\begin{aligned} defshare_{i,t} &= \alpha + \beta_1 after2001_{i,t} + \beta_2 after2001_{i,t} \cdot SGP_{i,t} \\ &\quad + \beta_3 after2001_{i,t} \cdot treated_{i,t} + \beta_4 after2001_{i,t} \cdot SGP_{i,t} \cdot treated_{i,t} \\ &\quad + \gamma X_{i,t} + \varepsilon_{i,t}, \end{aligned}$$

where $treated_{i,t}$ is a dummy equal to one for the experimental (post-1996) countries and zero for the placebo states and $X_{i,t}$ includes different fixed effects for the placebo and experimental countries. The difference-in-differences-in-differences estimator is equal to the coefficient β_4, which captures whatever difference occurs in SGP relative to non-SGP countries after the 2001 treatment, beyond what occurs in SGP relative to non-SGP countries after the 1990 treatment.

The panel for the main regressions includes data ranging from 1995 to 2005.[5] Data on military expenditures are from the Stockholm International Peace Research Institute (SIPRI 2006), and defense shares were constructed by dividing defense spending from SIPRI by nominal GDP data taken from the UN System of National Accounts (United Nations 2006). Data on government spending were also taken from the UN National Accounts. The dummy variables on military aid were constructed from levels of aid in the Greenbook of the US Agency for International Development (USAID 2006); I used dummy variables to avoid the endogeneity concerns of including amounts of defense aid received on the right hand side of the regression specification. Opinion data come from Question 61b of the Pew Global Attitudes Project (2003).

2.3 Identification Issues

My argument for exogeneity of the SGP to defense spending rests on two points. First, the Euro was discussed and created and the SGP was signed in the relatively peaceful 1990s. During that time, traditional economic concerns were discussed as being the prime motivators: the conduct of monetary

[5] The volatility regression is run on data covering only 1997-2000. If it were run on 1995-2005 there would be very little variation in the dependent variable; if it were run on 1998-1999 there would be fewer observations than parameters being estimated (fixed effects and trends are included in the regression).

policy, factor movements, transaction costs, European identity and solidarity, and ease of business. Peace in the Middle East or anywhere else was not among the reasons cited for monetary integration.

Second, although the SGP took effect in 1999, it originated in the 1992 Maastricht Treaty and was officially signed in 1997. Governments changed between the signing of the Pact and the start of conflict in 2001. Such political transitions mean that the preferred war policy was not necessarily the same at the signing of the Pact and the start of the War on Terror. While Jacques Chirac, a conservative, has been President of France since 1995, other nations have experienced regime changes. In Germany Helmut Kohl, relatively conservative, oversaw the signing of the Maastricht Treaty and the SGP while Gerard Schroeder, relatively liberal, was in power after 1998 and Angela Merkel, of the same party as Kohl, took over power in 2005. In Italy, Romano Prodi oversaw the signing of the SGP, and Silvio Berlusconi, more conservative, ran the government from 2001-2006. In the UK, John Major, a conservative, forced the UK to exit from the European Exchange Rate Mechanism while Tony Blair, relatively liberal, brought the UK into the War in Iraq.

There is no clear correlation between local left-right politics and either decisions to sign the Pact or decisions to go to war, and in many cases different governments oversaw the two issues. The fact that decision makers were bound by the budget rules decided upon by previous office holders suggests that the SGP was exogenous when decisions in 2001 and 2003 were being made.[6]

3 Results

In this section I report the results of the regressions. Table 2 presents the results of the main regression without trends, and Table 3 presents results with trends. In all three treatment years we see deficit-constrained countries spending less on defense than others: the β_2 are all negative.

Inclusion of the opinions control does not affect the sign and size of the coefficients, but makes them marginally insignificant at 10%. The loss of significance is probably due to the fact that the sample size is cut by over

[6]Because Greece decided to adopt the Euro at the time of the treatment effects this condition does not hold; I therefore exclude it from the sample. However, its inclusion induces very little change in the results.

two thirds and there are only three treated countries; a regression on the reduced sample without the opinion variable yields similar results. Altering the combination of other controls does not affect the result.

TABLE 2: Results of regression 1, no country-specific trends

	(1) Treatment year 1999	(2) Treatment year 2001	(3) Treatment year 2003	(4) 1999, 2001 treatments	(5) 1999, 2003 treatments	(6) 2001, 2003 treatments	(7) All treatments
NATO	0.0188	-0.0326	-0.0063	0.0132	0.0124	-0.0339	0.0108
	(0.0960)	(0.0781)	(0.0661)	(0.0966)	(0.0961)	(0.0780)	(0.0968)
Govt. share	-0.3918	0.3505	0.1169	-0.0222	-0.1221	0.3869	0.0248
	(2.2536)	(2.1399)	(2.2500)	(2.0721)	(2.1176)	(2.1143)	(2.0468)
Real GDP	-0.1129	-0.5676	-0.6633	-0.3584	-0.4047	-0.6691	-0.4651
	(0.3836)	(0.3826)	(0.3128)**	(0.4278)	(0.4204)	(0.3968)*	(0.4442)
Military aid	-0.0901	-0.0917	-0.1107	-0.0954	-0.1146	-0.1093	-0.1123
	(0.0559)	(0.0555)*	(0.0622)*	(0.0581)	(0.0629)*	(0.0598)*	(0.0625)*
Growth rate	-1.0197	-1.0133	-0.7974	-0.9967	-0.8249	-0.907	-0.8944
	(1.0156)	(0.9895)	(0.9244)	(0.9632)	(0.9274)	(0.9485)	(0.9227)
after1999	0.0236			-0.0818	-0.0255		-0.0797
	(0.0675)			(0.0577)	(0.0608)		(0.0575)
after1999*SGP	**-0.1232**			**0.0120**	**-0.0596**		**0.0139**
	(0.0655)*			**(0.0582)**	**(0.0593)**		**(0.0581)**
after2001		0.1264		0.1663		0.0759	0.1164
		(0.0691)*		(0.0642)***		(0.0588)	(0.0514)**
after2001*SGP		**-0.1734**		**-0.1801**		**-0.1377**	**-0.1463**
		(0.0661)* **		**(0.0646)*** **		**(0.0588)** **	**(0.0519)*** **
after2003			0.1444		0.1459	0.0911	0.0884
			(0.0678)**		(0.0618)**	(0.0511)*	(0.0515)*
after2003*SGP			**-0.145**		**-0.1183**	**-0.0469**	**-0.0461**
			(0.0632) **		**(0.0597)** **	**(0.0518)**	**(0.0521)**
Observations	437	437	437	437	437	437	437

Dependent variable is log defense share.
(Newey-West) clustered standard errors in parentheses; country-specific fixed effects and trends not reported.
* significant at 10%; ** significant at 5%; *** significant at 1%.[7]

The logarithmic specification allows us to interpret β_2 as the percentage change in defense shares associated with SGP membership. According to

[7]I calculate all standard errors by clustering by country to account for arbitrary country-specific autocorrelation. As pointed out by Bertrand, Duflo, and Mullainathan (2004, p. 271) this is equivalent to using Newey-West (1987) standard errors where bandwidth is set to give some weight to each lag. Doing so ensures consistent, but not necessarily efficient, estimation of standard errors. Use of a quadratic spectral kernel (Andrews 1991) instead of the Bartlett kernel proposed by Newey and West does not substantially alter the results. This suggests that the sample is large enough to produce consistent estimates and the small-sample problems with HAC estimation discussed in Kiefer and Vogelsang (2002) are not relevant. In all cases, setting the bandwidth to give weight to fewer lags than the full time-series reduces the standard errors.

this interpretation, columns 1-3 suggest that deficit constraints are associated with a 12-17% smaller defense share in times when changes in military spending would be reasonable.

TABLE 3: Results of regression 1, country-specific trends

	(1) Treatment year 1999	(2) Treatment year 2001	(3) Treatment year 2003	(4) 1999, 2001 treatments	(5) 1999, 2003 treatments	(6) 2001, 2003 treatments	(7) All treatments
NATO	0.2141	0.0828	0.1333	0.2123	0.2157	0.1495	0.2149
	(0.0832)**	(0.0630)	(0.0693)*	(0.0837)**	(0.0838)**	(0.0714)**	(0.0841)**
Govt. share	2.7065	2.8242	2.4556	2.5468	2.4546	2.2095	2.235
	(1.2991)**	(1.5089)*	(1.4809)*	(1.2916)**	(1.3636)*	(1.4457)	(1.3735)
Real GDP	0.3468	0.0563	0.1609	0.3012	0.4134	0.001	0.2892
	(0.9810)	(0.8425)	(0.9308)	(0.9448)	(0.9912)	(0.8945)	(0.9566)
Military aid	-0.0036	0.0249	0.0053	0.0038	-0.0056	0.0123	0.0024
	(0.0196)	(0.0213)	(0.0203)	(0.0200)	(0.0197)	(0.0200)	(0.0199)
Growth rate	-0.1980	-0.3844	-0.2494	-0.2928	-0.2011	-0.3365	-0.2956
	(0.8328)	(0.9120)	(0.8868)	(0.8474)	(0.8403)	(0.8890)	(0.8554)
after1999	-0.1446			-0.1305	-0.1107		-0.0895
	(0.0559)***			(0.0578)**	(0.0612)*		(0.0673)
after1999*SGP	**0.0878**			**0.0758**	**0.0688**		**0.0511**
	(0.0586)			**(0.0606)**	**(0.0640)**		**(0.0694)**
after2001		0.1254		0.1073		0.127	0.1147
		(0.0656)*		(0.0660)		(0.0653)*	(0.0696)*
after2001*SGP		**-0.1260**		**-0.1136**		**-0.1246**	**-0.1170**
		(0.0642)**		**(0.0659)***		**(0.0635)****	**(0.0685)***
after2003			0.1118		0.0616	0.1141	0.0734
			(0.0532)**		(0.0585)	(0.0537)**	(0.0626)
after2003*SGP			**-0.0658**		**-0.0293**	**-0.0713**	**-0.0422**
			(0.0524)		**(0.0567)**	**(0.0534)**	**(0.0610)**
Observations	437	437	437	437	437	437	437

Dependent variable is log defense share.
(Newey-West) clustered standard errors in parentheses; country-specific fixed effects and trends not reported.
* significant at 10%; ** significant at 5%; *** significant at 1%.

This difference is not only statistically significant but substantively important. When output is hundreds of billions or even trillions of dollars, 12-17% of an average 1.8% defense share, or 0.2-0.3% of output, is a very large sum. Thus a substantial portion of the recent differences in defense activity between countries can be explained by the Pact.

In columns 4-7 of Tables 2 and 3, I report the results when multiple treatments are tested at once. The results reported in these columns suggest that the 2001 effect was the strongest; its inclusion in the same regression

eliminates the significance of the 1999 and 2003 treatments, and it is the only one to remain significant when controlling for trends. However, in column 3 of Table 1, when the 2003 treatment alone is evaluated, it is still highly significant. With columns 4 and 5, these results suggest that it is likely that the 1999 effect merely picks up the later 2001 treatment and that what happens after 2003 is significant by itself, yet insignificant when considered as a marginal treatment beyond that in 2001. Still, in column 6 of Table 1, I cannot reject the hypothesis that the 2001 and 2003 treatments are statistically identical, yet I can reject (with 95% confidence) the hypothesis that they are both equal to zero. In the presence of trends, I am unable to reject the hypothesis that the 2001 and 2003 treatments are identical.

TABLE 4: Results of regression 2

No country-specific trends				Country-specific trends			
Control Variables		*Treatment Effects*		*Control Variables*		*Treatment Effects*	
NATO	0.0116	1995*sgp	-0.0738	NATO	0.2264	1995*sgp	-0.0083
	(0.0969)		(0.1034)		(0.0866)***		(0.1103)
Govt. share	-0.053	1996*sgp	-0.0655	Govt. share	2.0824	1996*sgp	-0.0395
	(2.0107)		(0.0823)		(1.4132)		(0.0854)
Real GDP	-0.4141	1997*sgp	-0.0586	Real GDP	0.0895	1997*sgp	-0.0578
	(0.4637)		(0.0545)		(1.0901)		(0.0566)
Military aid	-0.2454	**1999*sgp**	**0.0048**	Military aid	-0.0839	**1999*sgp**	**0.0131**
	(0.0955)**		**(0.0480)**		(0.0396)**		**(0.0450)**
Growth rate	-0.9245	**2000*sgp**	**-0.0758**	Growth rate	-0.2753	**2000*sgp**	**-0.0747**
			(0.0734)		(0.8117)		**(0.0605)**
		2001*sgp	**-0.1845**			**2001*sgp**	**-0.1847**
			(0.0895)**				**(0.0700)*****
		2002*sgp	**-0.1767**			**2002*sgp**	**-0.1837**
			(0.0885)**				**(0.0674)*****
		2003*sgp	**-0.2174**			**2003*sgp**	**-0.2271**
			(0.0996)**				**(0.0733)*****
		2004*sgp	**-0.2238**			**2004*sgp**	**-0.2637**
			(0.1030)**				**(0.0763)*****
		2005*sgp	**-0.1559**			**2005*sgp**	**-0.2910**
Observations							**(0.0806)*****

Dependent variable is log defense share.
(Newey-West) clustered standard errors in parentheses; year-specific fixed effects and country-specific fixed effects and trends not reported.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4 reports the results of the second regression, when each year is given its own dummy variable, omitting 1998 to stylize the discontinuity of the Pact's taking effect. The results in Table 4 suggest that there is a significant effect relative to conditions in SGP countries in 1998 for every year beyond 2000; these are stronger results than those of Tables 2 and 3, and confirm that the actual enactment of the Pact in 1999 in the absence

of exogenous conflict had no effect. The regressions are picking up what can be seen graphically in Figure 2: after the Cold War, worldwide defense spending was declining, until the world became aware of the new threat of international terrorism. At this point, countries not bound by the Pact were able to react more than their counterparts since they could raise revenue more cheaply.

Table 5 reports the results for the regression which I use to test the third hypothesis. Here the data are not in accord with the theory: the difference in volatility between SGP and non-SGP countries after the signing of the Pact is indistinguishable from the differences before the Pact.

By looking at Figure 2, which graphs the average defense share for SGP and non-SGP countries, we can see that the volatility of defense spending is always greater in the countries that did not join the SGP than in those that did. Thus even though a simple regression of volatility on SGP membership yields significant results, we cannot infer causality of the SGP.

TABLE 5: Results of regression 3

	No country-specific trends	*Country-specific trends*
NATO	-0.0294	-0.0484
	(0.0332)	(0.0438)
Government share of output	2.8688	2.8034
	(0.9679)***	(1.1923)**
Real GDP	-0.3149	0.1620
	(0.2748)	(0.6811)
Military aid	0.105	0.1735
	(0.0370)***	(0.0639)***
Defense share	-3.1867	3.0750
	(2.4491)	(3.5461)
Growth rate	-0.3184	0.1801
	(0.3087)	(0.2579)
after1999	-0.0238	-0.0421
	(0.0315)	(0.0371)
after1999*SGP	**0.0253**	**0.0164**
	(0.0264)	**(0.0404)**
Observations	160	160

Dependent variable is scaled standard deviation of defense share.
Clustered standard errors in parentheses; country-specific fixed effects and trends not reported.
* significant at 10%; ** significant at 5%; *** significant at 1%

In Table 6, I report the results of the difference-in-differences-in-differences regression. It is clear from this table that the DDD estimator is negative and that the same group of countries react to conflict differently in the presence of the SGP than they do in its absence. The DDD coefficient in both trends and no-trends regressions is significant in a two-sided test at 7% significance and a one-sided test at 4% significance.

This suggests the SGP was in fact responsible for the differences in defense spending; if the countries who ultimately signed the Pact would react the same in any international conflict, then the DDD coefficient would be insignificantly different from zero. The DDD coefficient with trends suggests that the SGP is associated with a 25% smaller defense share, or on average, 0.45% GDP.

If we wish to explain differences in European leaders' behavior between the two Iraq wars, the fiscal constraints imposed by the SGP offer a testable way of doing so. The theory, in addition to being consistent with the regression analysis above, is also consistent with two pieces of anecdotal evidence. First, the main European contributors to the second Iraq War are not bound by the SGP; see Table 6 for the relevant data. Of the 33 countries with troops in Iraq in early 2004, 22 of them were European and of these only 5 were bound by the SGP.

TABLE 6: Results of DDD regression

	No country-specific trends	*Country-specific trends*
NATO	-0.0319	0.0853
	(0.0632)	(0.0573)
Government share of output	-0.3585	1.9763
	(1.4705)	(1.7717)
Real GDP	-0.3280	4.2393
	(0.6356)	(3.9557)
Military aid	-0.0239	-0.038
	(0.0798)	(0.0340)
Growth rate	1.0928	-0.1873
	(1.2001)	(0.7429)
after2001	-0.2147	-0.1483
	(0.1573)	(0.1552)
after2001*SGP	0.1619	0.1351
	(0.1506)	(0.1287)
after2001*treated	0.3300	0.2495
	(0.1544)**	(0.1599)
after2001*SGP*treated	-0.2980	-0.2458
	(0.1629)*	(0.1362)*
Observations	622	622

Dependent variable is log defense share.
(Newey-West) clustered standard errors in parentheses. Country-specific fixed effects and trends not reported.
* significant at 10%; ** significant at 5%; *** significant at 1%

Second, consider the public behavior of European governments: the list of European countries whose heads of state, during the run-up to the 2003 war, endorsed the Bush administration's position on Iraq consists of the UK, Italy, Spain, Poland, Hungary, the Czech Republic, Estonia, Latvia,

Lithuania, Bulgaria, Romania, Slovakia and Slovenia.[8] Of these nations, the only one which is at the margin bound by the SGP is Spain. Although many of these countries hope eventually to join the EMU, their time horizons for joining stretch from 2008-2013, and the barriers many of them face are more inflationary than debt-related.

Table 6: Troop involvement in Iraq, March 2004

Involvement Rank	Country	Troops
1	USA	130,000
2	UK	9,000
3	*Italy*	*3,000*
4	Poland	2,460
5	Ukraine	1,600
6	*Spain*	*1,300*
7	*Netherlands*	*1,100*
8	Australia	800
9	Romania	700
10	Bulgaria	480
11	Thailand	440
12	*Denmark*	*420*
13	Honduras	368
14	El Salvador	361
15	Dominican Republic	302
16	Hungary	300
17	Japan	240
18	Norway	179
19	Mongolia	160
20	Azerbaijan	150
21	*Portugal*	*128*
22	Latvia	120
23	Lithuania	118
24	Slovakia	102
25	Czech Republic	80
25	Philippines	80
27	Albania	70
27	Georgia	70
28	New Zealand	61
29	Moldova	50
31	Macedonia	37
32	Estonia	31
33	Kazakhstan	25

Constrained countries in italics.
Source: *The Australian*, March 17, 2004

4 Discussion

4.1 Policy Implications

Although the evidence suggests that budget rules can influence a country's

[8] See Sands (2003) for a report from the popular press.

military decisions, they should probably not be considered a general policy tool against war except in very special circumstances. If the people of one country undertake such a restriction, other nations might seize upon this weakness, knowing war will be more expensive for the constrained country and it will be more easily defeated or willing to concede more to maintain peace. Any policy recommendations would have to include a dynamic analysis with multiple governments and general equilibrium effects that were not examined in this paper.

However, deficit caps might offer an additional policy instrument for post-war treaties and other international diplomatic affairs. For instance, following World War II, Germany and Japan were forbidden to maintain a standing army for fear that they would resume fighting. Instead of imposing a ban on the army, a limit on deficits would have affected the price and perhaps achieved the same end; in this sense, by raising prices of socially harmful activity, deficits may be viewed as a type of Pigovian tax. A similar policy might be considered as a condition for USAID, World Bank or IMF assistance to nations that these organizations fear may turn violent. Such experiments, however, would require a tremendous amount of case-by-case analysis, as any cap on deficits will carry other consequences, like limits on countercyclical fiscal policy. If an external power can so carefully moderate public debt, it would likely be able to control defense spending directly; still, there may be cases in which direct control of defense spending is politically infeasible and deficit caps may serve as an additional policy instrument.

Finally, the results have implications for countries considering joining the European Monetary Union, as well as for the formation of future currency unions. If a currency union with a single monetary policy cannot function without fiscal constraints, it may limit the union's ability to respond to security threats, thus inviting the general equilibrium effects I described above.

4.2 Concluding Remarks

I have considered situations in which the optimal level of defense spending a government chooses depends on the fiscal mix it can use to finance its expenses. In ordinary circumstances the government wishes both to defer payments and to smooth taxes due to their convex distortions. However, if there are limits to deficits, tax smoothing may not be possible. If a constrained government wishes to respond to an international crisis, it will have to finance its response through immediate taxation, incurring large efficiency

and political costs. Such reasoning predicts that a cap on deficits raises the costs of going to war, and that a government thus constrained will spend less on defense.

These predictions are borne out in both regression analysis and anecdotal observations. A 12-25% difference in proportional defense spending is associated with being bound by the Stability & Growth Pact around dates at which the military decisions of governments differ. The initial imposition of the budget rules had no discernible effect, while the budget rules interacted with the fighting in 2001, and possibly that in 2003, had clearer statistical associations with defense spending. Precisely those governments which are not bound by the SGP have been the most vocal supporters of the Bush Administration's Iraq policies.

It is an open question as to whether the sentiments of the European public, which have been vocally anti-war, are determined by these same fiscal considerations. Such a hypothesis could be justified on grounds that the public consists of forward-looking, rational agents who are aware of the future costs of raising revenue and build these considerations into their decisions. Alternatively, peoples' pacifism could be a psychological rationalization of their governments' decisions: their governments are not participating in wars not because the wars are expensive, but because they are unjust. It is easier to view oneself as morally upright than cheap.

Such an economic explanation is counter to traditional explanations for European sentiments which have relied on relative preference changes: for example, Robert Kagan (2003, pp. 3, 55) famously claimed that "Americans are from Mars, Europeans are from Venus: they agree on little and understand one another less and less" when it comes to viewpoints about global politics, and that Europeans have "a perspective on power that Americans do not and cannot share, inasmuch as the formative historical experiences on their side of the Atlantic have not been the same." An explanation of changing prices for Eurozone countries relative to other countries runs contrary to this sort of received wisdom. While it is possible people are rationally anti-war because of war's increased price, determining the effect of fiscal constraints on public opinion is trickier than determining their effect on government agents.

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