FISCAL DISCIPLINE ACROSS GOVERNMENT TIERS[a]

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Abstract

This paper analyses how fiscal adjustment comes about when both central and sub-national governments are involved in consolidation. We test sustainability with a fiscal rule that is augmented with vertical and horizontal transfers. Results for the German Länder show that lower tier governments bear a relatively smaller part of the burden of adjustment, if they consolidate at all. Most of the fiscal adjustment occurs via central government debt. In the US, both the federal and state level contribute to consolidation of public finances.

Keywords: fiscal policy, fiscal rules, EMU, SGP, fiscal federalism.
JEL codes: E61, E62, H11, H72, H77.

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Extended abstract

The aim of this paper is to analyse how fiscal adjustment comes about when both central and sub-national governments are involved in consolidation. Devolution of public finances creates problems of fiscal imbalance at lower tiers of government. Whereas there usually is a constitutionally determined division of spending tasks, revenues are shared across different government levels. This creates some vertical fiscal imbalance if fiscal autonomy is not complete, and requires transfers from the central government. Moreover, intergovernmental transfers are also used to complement regional budgets for reasons of equity horizontal. This reduces incentives for lower tier governments to pursue fiscal discipline. In extreme cases, this may even entail bail-out. Federal fiscal arrangements are therefore often complemented with a control system on the sustainability of public finances at lower tiers.

However, with the exception of Wibbels and Rodden (2006) and Darby et al. (2005), the analysis of fiscal sustainability across different government levels, has not been considered in the literature. In this paper, we test fiscal sustainability for central and regional governments jointly in two decentralised countries. Vertical imbalance is rather similar in the US and Germany. But institutional settings are quite different and imply that horizontal transfers are more important for regional budgets in Germany. From a methodological point of view, we extend the usual approach in the literature to analyse fiscal sustainability (a positive reaction of the fiscal surplus to public debt) to consider different tiers of government.

Results indicate a rather different behaviour of fiscal policy in both countries. In the US, both the federal and state governments keep debt under control. In Germany instead, lower tier governments do not consolidate at all. All of the fiscal adjustment occurs via central government debt. The central government cannot induce lower tiers to react in a stabilising way to debt . It has little vertical transfers at its disposal to make Länder internalise the spillover on aggregate debt. Moreover, the application of fiscal rules is lax.

Keywords: fiscal policy, fiscal rules, EMU, SGP, fiscal federalism.
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1. INTRODUCTION

Devolution of public finances creates problems of fiscal imbalance at lower tiers of government. Whereas there usually is a constitutionally determined division of spending tasks, revenues are shared across different government levels. This creates some vertical fiscal imbalance if fiscal autonomy is not complete. In addition to (vertical) transfers from the central government, (horizontal) transfers between governments of the same tier complement regional budgets for reasons of equity. This reduces incentives for lower tier governments to pursue fiscal discipline. In extreme cases, this may even entail bail-out (Rodden et al., 2003).

In the fiscal federalism literature, the problem of consolidation of public finances is commonly considered from the sub-national perspective. It is less well understood how to spread the burden of fiscal adjustments across various tiers of government to maintain fiscal sustainability at the aggregate level. This overlooks the strategic interactions between different tiers of government, and in particular the means of financing budgets. In particular, we hypothesize that fiscal systems financed by horizontal grants reduce incentives for regional governments to take debt developments in consideration. Vertical transfers instead give the federal government leverage over the fiscal policy of every region. The internalisation of the effects on the aggregate debt position, renders the regional budgets more responsive to debt build up.

The aim of this paper is to analyse how fiscal adjustment comes about when both central and sub-national governments are involved in consolidation. We test sustainability with a fiscal rule in which the budget surplus responds to debt developments (Bohn, 1998). This test has become rather popular but the analysis usually applies to general government data. We instead test fiscal rules augmented with cyclical conditions and the amount of vertical transfers, for both central and regional governments. A panel analysis of regional fiscal policies gives a more detailed insight in the reaction of lower tier governments.

We compare sustainability public finances in two federal countries with apparently similar fiscal institutions. Both US states and German Länder are subject to budget rules, but are able to issue debt autonomously. Both have a similar degree of vertical fiscal imbalance. But while in the US, the majority of transfers are provided by the

central budget, Länder are predominantly financed by intergovernmental transfers which are complemented with specific transfers from the central level. At the same time, the tax autonomy of lower government tiers is constrained.

The paper is structured as follows. In section 2, we develop the hypothesis that the financing structure of the fiscal system has implications for the consolidation efforts of different tiers of government. We illustrate this for the US states and the German Länder. In section 3, we present the fiscal rule as a means for testing sustainability. We augment the baseline specification to account for different tiers of government. Section 4 discusses the results. Concluding remarks follow in section 5.

2. SHARING THE BURDEN OF DEBT ACROSS GOVERNMENT TIERS

In the fiscal federalism literature, the problem of consolidation of public finances is usually considered from the sub-national perspective. The concern is with the incentives that the fiscal system in federal states gives to lower tier governments to indulge in unsustainable policies. Regional governments have little leeway to adjust spending to satisfy the intertemporal budget balance. On the spending side, regional governments often have very precisely constitutionally stipulated tasks on which it is difficult to renege. On the revenue side, governments share tax revenues and co-decide on tax bases and rates. If economic linkages across a country's regions are strong, little flexibility is allowed in differentiating regional budgets. This rigidity of the fiscal system easily leads to fiscal deficits and the build-up of regional debt. The probability of a bailout depends on the vertical fiscal imbalance, expressed as the gap between the subnational government's own revenue and its expenditure responsibilities.

Most studies focus on cases of regional default and bailout (Rodden et al., 2003). It is less well understood how to spread the burden of fiscal adjustments across various tiers of government to maintain fiscal sustainability at the aggregate level.[a] The ongoing process of fiscal decentralisation world-wide urges some insight in the process of fiscal adjustment in federal states (Ter-Minassian, 1997; Wildasin, 1997). In existing federal states, different solutions have been implemented, which range

[a] Darby et al. (2005) stress the importance of fiscal adjustment across all government levels for achieving an economically successful consolidation. Wibbels and Rodden (2006) examine the cyclicality of central versus regional fiscal policies.

from numerical deficit/debt rules to more cooperative solutions. In newly created federal structures, the central government searches for agreements with lower tier governments to contribute to stabilisation of the 'historical' central debt burden (e.g. Belgium).

Disentangling the effect of different fiscal systems on aggregate fiscal sustainability is fraught with difficulties, however (Bordignon, 2006). The analysis of the aggregate level introduces strategic behaviour of both central and sub-national tiers of government. The central government can set up the fiscal system so as to avoid recourse of regions to the central budget. In contrast, sub-national levels may anticipate future adjustments in grants of other governments.

We hypothesize that the sustainability of fiscal policy depends on the leverage the central government has over the financing of regions. The build-up of debt at regional level does not depend on the overall degree of vertical fiscal imbalance, but on the financing of this gap. I.e., if the central government is the main provider of (vertical) transfers to the regional government, it can influence the setting of regional fiscal policy. In this way, the central government internalises the effects of regional fiscal policies in its grants scheme. In contrast, if horizontal transfers make up the major part of the financing gap, regions are less inclined to adjust their fiscal policies. As a consequence, the response to regional (and aggregate) debt is weakened.

The US and Germany provide a good testing ground for this hypothesis. Both federal countries have similar institutional settings. Both US states and German Länder are able to issue debt autonomously, but neither have access to central bank financing, nor can they be sued and trialled for bankruptcy. The conduct of regional fiscal policy is constrained by fiscal rules. In the US, these rules are self-imposed but have not avoided bankruptcy at the county or city level.[b] Article 115 of the German Basic Law allows for a 'golden rule' deficit and this applies both to the federal and the state governments. Only under the exceptional circumstances of a general economic disequilibrium is further deficit financing allowed. The interpretation of Article 115 has been rather generous, however, as prolonged violations of this rule have never led to court trials, nor to any reprimand by the federal government. Fiscal bailouts by the federal government or other regional governments are not explicitly prohibited. Fiscal

[b] Some well known examples are New York City in the 1970s, Orange County in the 1980s and Washington DC and Philadelphia in the 1990s.

crises have largely been avoided by a mixture of controls on the projected debt service of Länder, the coordination of financial policies for all tiers of government by the Financial Planning Council, and administrative controls on local government financing. Nevertheless, two small German states – Bremen and Saarland – sued the German government for the Federal Constitutional Court when a fiscal crisis loomed at the end of the eighties. The Court forced the Federal government to directly finance both states' budgets, on the basis of the constitutional principles of fiscal homogeneity and the equalisation of living conditions.

This highlights the main difference between the US and German federal fiscal system. Regions in either country have a similar degree of vertical fiscal imbalance (Figure 1). But while in the US, the majority of transfers are provided by the federal budget, Länder are predominantly financed by intergovernmental transfers. Fiscal homogeneity across German Länder requires the balancing of resources over different tiers of government and between economically weak and strong regions. This horizontal repartition of government revenues (*'Länderfinanzausgleich'*) is explicitly written into the German Constitution.[c] These are further complemented with vertical transfers from the federal level to further reduce economic disparities and finance specific tasks.[d]

3. METHODOLOGY

There are two major difficulties in analysing fiscal relations across governments. First, there are strategic interactions between tiers of government that are hard to identify. Second, the unsustainability of fiscal policy depends on the fiscal system but is a latent variable. Bail-outs are rare events. It is hard to derive measures of the expectations of bail-out as financial markets react in non-linear ways to information on fiscal problems. Hence, sovereign ratings do not provide correct information. We bypass the latter problem by recasting a test for debt sustainability à la Bohn (1998)

[c] No German government tier has direct decision power on tax rates, but needs agreements with all other tiers before rates can be changed for the entire federation. Only a quarter of regional revenues is earmarked to one tier of government only whereas the remaining three quarters of all revenues are shared with the other units of government. This leaves the states with little flexibility on the revenue side of the budget.

[d] Horizontal transfers are shared VAT-revenues so that each state reaches at least 92% of average fiscal capacity. Additional vertical transfers compensate for the cost of political administration, smoothen the transitional losses and gains for the various states after Reunification, and – importantly – contribute to the consolidation of debt in Bremen and Saarland. The latter vertical grants account for 10% of total revenues for the West German states, but this amounts up to 40% for the new states. The horizontal grants reduce on average 4% of revenues in the West German states, to add up to 7% of extra fiscal capacity in the East. See Seitz (1999) and Fitch IBCA (2005) for more details.

in terms of a fiscal policy rule that accounts for the interaction between various tiers of government. We accordingly test this augmented fiscal rule for a panel of US states and German Länder. We correct the estimates for cross-sectional dependencies.

3.1. The fiscal rule

Fiscal policy is deemed sustainable when the government obeys to the intertemporal budget constraint. I.e., the sum of the present discounted value of expected future primary surpluses suffices to pay off current debt. Various alternatives have been suggested in the literature. Usually, tests of the intertemporal budget constraint are based on the time series properties of deficit and debt variables. These tests for the stationarity of debt and surpluses, or the cointegration between spending and revenues, entail rather strict economic assumptions. There is in fact a broad class of stochastic processes that violate these time series properties, but nonetheless satisfy the intertemporal budget constraint. Bohn (1998) proofs a robust alternative condition for sustainability that is based on the response of the fiscal surplus s_t to public debt b_t, as in (1):

$$s_t = rb_t + m_t . \qquad (1)$$

A strictly positive r response of the government to debt developments is a sufficient condition for fiscal policy satisfying the intertemporal budget constraint. The only assumptions are that the data generating process for fiscal policy is stationary and ergodic. The residual m_t is a composite of other determinants that in aggregate is assumed bounded as a share of GDP. The basic intuition is that $r_t > 0$ in (1) implies that future debt is reduced by factor $(1-r)^n$ at horizon n indicating compliance to the budget constraint. The strength of the fiscal rule lies in its robustness. Fiscal policy is sustainable if $r_t > 0$ applies infinitely often within sample. In this way, we avoid making assumptions on the expectations of bail-out. It is sufficient that the government responds to debt for policy to be sustainable.[e]

[e] If the series s_t and b_t are integrated, the rule (#rule1) can be given a cointegration interpretation. We disregard applying panel unit root and cointegration tests to analyse the sustainability of subnational fiscal policies. For such an analysis, see Claeys (2006).

3.2. Methodology

In first instance, we simply compare the debt sustainability response for the different levels of government. We test sustainability of fiscal policy on a baseline fiscal rule as (1). We first estimate the rule by OLS for the general government, i.e. the consolidated budget of the central and regional governments. We then compare the contribution of either the central government or regional fiscal policies in responding to debt developments. We provide fiscal rule estimates for the aggregate of regional data, as well as for every region individually. The latter ignores important cross-dependencies in state budgets due to economic and institutional links (Case et al., 1993). All regions share a common monetary and federal fiscal policy. There are also changes in federally mandated expenditures that influence state budgets. Moreover, mobile tax bases implicitly impose some constraints on revenues. We apply panel OLS estimates that control for this heterogeneity by subsuming these in the fixed effects.

The setting of fiscal policy is determined by many other factors of course. The fiscal rule has seen various applications in different, often non-related fields. First, much of the analysis gauges the sensitivity of some fiscal policy indicator to the cycle y_t. There are cyclical variations in the surplus because of the workings of automatic stabilisers. In addition, fiscal policy probably induce economic fluctuations as well.

$$s_t = rb_t + ay_t + e_t . \qquad (2)$$

Second, we look in the reaction of the different tiers of governments to the vertical transfers received from the federal government. We augment the fiscal rule with a response to vertical transfers (V) and examine the consequences on the debt response. We test the hypothesis whether the federal government can induce fiscal adjustment by curbing transfers to lower tier governments.

$$s_t = rb_t + ay_t + lV_t + e_t . \qquad (3)$$

We specify all variables in real levels, except for the first log difference of real GDP.

3.3. Data

Fiscal policy data for the US come from two sources. General government data, and its division in federal and state government data, come from the NIPA accounts at the

Bureau of Economic Analysis. Detailed data on state fiscal policies come from the Census State Governments Finance Database. These data cover fifty US state and local governments. Since 2001, consolidated data are not available anymore, and we therefore limit the sample to the period 1963-2000. This gives us a balanced panel of annual data with 1938 observations.[f]

The Reunification of Germany urges us to constrain the sample to the period 1991-2004. General government series are from the OECD, while data for the central government and the aggregate of all Länder come from the Statistisches Bundesamt. The regional data on fiscal policies are consolidated across Länder and towns. These data are provided in several publications of the Ministry of Finance. Several changes have occurred in the sample of German Länder. The former Eastern German Länder have participated in the *Finanzausgleich* system since 1994 only. As from 2005, a major reform of the *Finanzausgleich* system has taken place.

We plot in figure 2 the net lending and debt ratios to GDP for the different government tiers in the US and Germany. Fiscal policy in the US is mainly dominated by variations in federal fiscal policy. The constant trend towards deficits has been reversed under the Clinton Administration to reach surplus in 1998 again. A similar trend is much less outspoken for state fiscal policies. As a consequence, federal deficits mainly contribute to the continued rise in public debt (Figure 3). State debt ratios hoover around 15 per cent of GDP. A closer look at the state deficits and debt ratios shows a more varied picture. As a summary of the panel of states, we have plotted histograms for both the net lending and debt ratio in Figure 4. Notice that all series are expressed as ratios to gross state product. There is no evident deficit bias. On average, there is a slight deficit, but the distribution is skewed towards surpluses around ratios that otherwise peak around zero. The deficits are also not concentrated in a few large borrowers, and it is no surprise then that there are no outliers in the debt ratio either. The mean debt ratio stands at 14 per cent of gross state product, and the highest ratio observed (37 per cent) is still low in comparison.[g] Apparently, state fiscal policies are rather well behaved.

German regional policies are as important as the federal budget in determining the overall budget balance. In fact, most of the variation in the balance of the general

[f] For a detailed description of variables and data sources, see Appendix A.

[g] The highest debt ratio (37%) occurred in Utah in 1987, the lowest ratio in South Dakota in 1974 (at 3.34%). The largest deficit happened in 1999 in Wyoming instead, and the largest surplus in 1975 in Washington DC.

government is due to changes in the fiscal stance of the Länder. Both the federal government and the Länder contribute in almost equal proportions of 25 per cent to the overall debt position. In recent years, the federal government contributes about 10 per cent more than the regional tier. We have displayed the debt ratios for the German Länder in Figure 5 over the period 1991-2004. The situation of the three city-states (Berlin, Bremen and Hamburg) and the smallest German region (Saarland) are illustrative of the evolution of public finances of all Länder since Reunification. The first characteristic concerns the bailed out states. The peak in indebtedness in Saarland and Bremen – just before the federal bailout in 1993 – is apparent. The continuous financial support to both regions has only in part led to a reduction in public debt levels to the German average. Ratios have bounced back in recent years. The size of the state does not seem to matter much. Hamburg has maintained a nearly constant debt ratio around 20 per cent as in most large German Länder. A second striking feature of Figure 5 is the steady position of debt ratios, within and across other Western German Länder, in a range of about 10 to 25 per cent. A third group consists of former Eastern German states. The dramatic increase in Berlin's public debt is part of a phenomenon observed in all former Eastern-German Länder. Debt was nearly inexistent before Reunification but has quickly shot up.[h]

This debt evolution highlights differences in deficits in the Eastern and Western German Länder. We see indeed that there is a slight deficit bias in the large Western German Länder and Hamburg (Figure 6). In contrast, the Eastern German Länder coped in the first years after Reunification with large deficit problems. This was a problem of very large expenditures not being offset by less than average revenues. Until 1994, a large gap between both sides of the budget persisted. At that point, these states entered the *Finanzausgleich* system, and were entitled to extra revenues. The consequent increase in revenues brought budgets closer to equilibrium. Public finances in Berlin, Saarland and Bremen are more erratic, and the large consolidations of 1994 and 1997 are not completely persistent, with deficits continuing to cumulate afterwards. Finally, we observe a general increase in Länder deficits in recent years.

4. RESULTS

We first test a baseline fiscal rule with a response to debt only. The results for the general government confirm some of the earlier insights in the literature. US fiscal

[h] The only exception here is Sachsen.

policy is sustainable (Table 1). The response is somewhat weaker than what other studies find (Bohn, 1998, 2005). For Germany, the response to debt is insignificant instead (Table 2). The explanatory power of the baseline fiscal rule is not very large. If we include a reaction to cyclical conditions and estimate rule (2), these results do not change. The explanatory power of the model is only marginally improved.

Both in the US and Germany, the reaction to debt results from opposing responses from the two tiers of government. In the case of the US, the federal government's stabilising response to debt is only weakly significant. At the same time, the reaction of state fiscal policies to debt is very strong. In contrast, the German federal government stabilises debt, but Länder ignore fiscal sustainability.

The receipt of federal transfers tends to raise the surplus in US states (rule (3)), but not significantly so in German Länder. If we condition the response of regional governments on the receipts of vertical transfers of the federal government, the response to debt becomes smaller (and less significant) in both the US and Germany. These results hold regardless of the reaction of the surplus to economic growth.

Panel estimates confirm the results for the regional governments for each of the rules (1) to (3). Table 3 shows that US states respond significantly to debt, but less so when they receive vertical transfers. A state-by-state estimation of the fiscal rule shows that there is some heterogeneity in the responses, however (Table 4). The debt response is negative in two states (Washington DC and Massachussets) and insignificant for a quarter of all states. The effect of vertical federal transfers is insignificant in most states.

There is substantially more heterogeneity across the German Länder (Table 3). Panel evidence indicates that the response to debt is negative (albeit insignificant). Few Länder disregard sustainability of their debt at the regional level, however. The response is negative for Nordrhein-Westfalen, Sachsen and Thuringen only.

There is evidence of significant breaks in the debt responses in the US only (Table 1). For the general government, a break occurs in the mid 70s. At the federal level, 1984 is a significant break instead. This result is also found by Taylor (2000). For the regional government, the break occurs in 1971. These findings are open to various interpretations. In the seventies, state fiscal policies experienced a major

retrenchment but a large expansion at the federal level that started a period of prolonged deficits (e.g., the tax cut of the Ford Administration). In the 80s, the change in monetary policy of the Federal Reserve could be responsible for changes in fiscal policy regime as well.

We estimate the baseline fiscal rule recursively (window of 10 years) and sequentially (window of 15 years)(Figure 7). This indicates some asymmetries in the debt stabilising response. After the large adjustment in the early 70s, state fiscal policies have been less concerned with debt since. The response turns negative towards the end of the sample. Likewise, since the last period of surpluses in the late sixties, the federal government has ignored sustainability till the mid-90s. Even then, the response has not been very strong.

5. CONCLUSION

The ongoing process of fiscal decentralisation world-wide urges some insight in the process of fiscal adjustment in federal states (Ter-Minassian, 1997; Wildasin, 1997). The aim of this paper is to analyse how fiscal adjustment comes about when both central and sub-national governments are involved in consolidation. However, with the exception of Wibbels and Rodden (2006) and Darby et al. (2005), the analysis of fiscal sustainability across different government levels, has not been considered in the literature. In this paper, we test fiscal sustainability for central and regional governments jointly in two decentralised countries. Vertical imbalance is rather similar in the US and Germany. But institutional settings are quite different and imply that horizontal transfers are more important for regional budgets in Germany. From a methodological point of view, we extend the usual approach in the literature to analyse fiscal sustainability (a positive reaction of the fiscal surplus to public debt) to consider different tiers of government.

Results indicate rather different behaviour of fiscal policy in both countries. In the US, both the federal and state governments keep debt under control. In Germany instead, lower tier governments do not consolidate at all. All of the fiscal adjustment occurs via central government debt. The central government cannot induce lower tiers to react in a stabilising way to debt . It has little vertical transfers at its disposal to make Länder internalise the spillover on aggregate debt. Moreover, the application of fiscal rules is lax.

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TABLES

Table 1. Fiscal rule, OLS results, US government, 1963-2000.

	general government		central government		regional government		
	(1)	(2)	(1)	(2)	(1)	(2)	(3)
r	0.02	0.02	0.03	0.03	0.56	0.56	0.31
	(0.06)	(0.05)	(0.08)	(0.08)	(0.00)	(0.00)	(0.00)
a		0.01		0.00		0.00	0.00
		(0.31)		(0.51)		(0.65)	(0.72)
l							1.41
							(0.00)
obs	38	38	38	38	38	38	38
F	(0.06)	(0.10)	(0.08)	(0.18)	(0.00)	(0.00)	(0.00)
R^2	0.06	0.06	0.05	0.04	0.93	0.93	0.96
AQ	1974		1981		1971		1983
	(0.00)		(0.00)		(0.00)		(0.00)
	[1972; 1976]		[1979; 1983]		[1969; 1973]		[1981; 1985]
AP	1974		1974		1971		1971
	(0.01)		(0.01)		(0.02)		(0.08)

Notes: p-values between parentheses, AQ and AP indicate the corrected Andrews Quandt and Andrews Ploberger break date for the coefficient r.
The 33% confidence interval is calculated as in Bai (1997).

Table 2. Fiscal rule, OLS results, German government, 1991-2005.

	general government		central government		regional government		
	(1)	(2)	(1)	(2)	(1)	(2)	(3)
r	0.00	-0.01	0.06	0.07	0.01	0.06	0.02
	(0.97)	(0.87)	(0.08)	(0.02)	(0.84)	(0.24)	(0.81)
a		19.00		0.01		0.05	0.05
		(0.00)		(0.00)		(0.03)	(0.06)
l							0.42
							(0.58)
obs	15	15	15	15	15	15	15
F	(0.97)	(0.01)	(0.08)	(0.01)	(0.84)	(0.07)	(0.15)
R^2	0.08	0.50	0.18	0.59	0.08	0.29	0.24
AQ	2001		2001		1996		-
	(0.37)		(0.47)		(0.13)		
AP	2001		1974		1996		-
	(0.14)		(0.26)		(0.07)		

Notes: p-values between parentheses, AQ and AP indicate the corrected Andrews Quandt and Andrews Ploberger break date for the coefficient r. The 33% confidence interval is calculated as in Bai (1997).

Table 3. Fiscal rules, panel fixed effects, US states and German Länder.

	United States 1963-2000			Germany 1991-2004		
	(1)	(2)	(3)	(1)	(2)	(3)
r	0.16	0.16	0.05	-0.01	-0.01	-0.02
	(0.00)	(0.00)	(0.00)	(0.31)	(0.18)	(0.18)
a		1.15	0.36		0.00	-0.01
		(0.10)	(0.54)		(0.20)	(0.12)
l			0.59			0.40
			(0.00)			(0.40)
obs	1938	1887	1887	224	192	159
F	(0.00)	(0.00)	)0.00)	(0.31)	(0.29)	(0.29)
R^2 within	0.75	0.75	0.78	0.01	0.02	0.03
R^2 between	0.90	0.90	0.94	0.92	0.91	0.43
R^2 overall	0.79	0.79	0.83	0.35	0.37	0.28
BP LM test for RE	0.00	0.00	0.00	0.00	0.00	0.00

Notes: p-values between parentheses, Breusch and Pagan LM test for random effects.

Table 4. Fiscal rule (3), OLS results, US states, 1963-2000.

	r	p-value	a	p-value	l	p-value	R^2
AK	0.22	(0.00)	0.01	(0.99)	0.20	(0.72)	0.42
AL	0.41	(0.00)	0.87	(0.88)	-1.15	(0.00)	0.29
AR	0.17	(0.20)	-0.26	(0.93)	0.09	(0.79)	0.50
AZ	0.09	(0.02)	1.50	(0.68)	0.06	(0.76)	0.56
CA	0.66	(0.00)	179.00	(0.01)	-2.42	(0.01)	0.40
CO	0.47	(0.01)	15.60	(0.10)	-2.49	(0.04)	0.31
CT	0.02	(0.86)	10.00	(0.12)	0.50	(0.57)	0.35
DC	-0.14	(0.03)	-2.94	(0.02)	0.40	(0.01)	0.38
DE	0.09	(0.07)	1.21	(0.24)	0.75	(0.03)	0.76
FL	0.14	(0.08)	-5.94	(0.78)	-0.20	(0.70)	0.56
GA	0.54	(0.00)	25.90	(0.02)	-1.60	(0.01)	0.46
HI	0.32	(0.12)	1.13	(0.71)	-1.47	(0.19)	0.14
IA	0.65	(0.00)	3.50	(0.08)	-1.49	(0.00)	0.50
ID	0.49	(0.15)	0.74	(0.57)	-0.77	(0.44)	0.43
IL	-0.14	(0.32)	-8.06	(0.75)	1.26	(0.13)	0.23
IN	0.14	(0.29)	4.25	(0.33)	-0.09	(0.85)	0.43
KS	0.25	(0.00)	-1.60	(0.52)	-0.54	(0.07))	0.64
KY	0.15	(0.31)	-1.07	(0.88)	-0.08	(0.92)	0.55
LA	0.08	(0.02)	-0.12	(0.95)	0.20	(0.09)	0.63
MA	-0.11	(0.02)	6.25	(0.45)	1.17	(0.00)	0.36
MD	0.49	(0.00)	6.87	(0.46)	-1.60	(0.01)	0.64
ME	0.07	(0.73)	1.66	(0.51)	0.33	(0.65)	0.42
MI	0.17	(0.33)	14.20	(0.19)	-0.05	(0.94)	0.39
MN	0.58	(0.00)	11.70	(0.20)	-2.57	(0.01)	0.49
MO	0.22	(0.26)	-0.46	(0.96)	-0.12	(0.85)	0.45
MS	0.26	(0.07)	-1.36	(0.61)	-0.30	(0.33)	0.39
MT	0.29	(0.00)	0.15	(0.78)	-0.41	(0.02)	0.79
NC	0.26	(0.04)	4.66	(0.72)	-0.33	(0.45	0.49
ND	-0.11	(0.14)	-0.07	(0.77)	0.76	(0.00)	0.71
NE	0.08	(0.13)	-1.85	(0.27)	0.42	(0.07)	0.59
NH	0.13	(0.02)	1.05	(0.28)	-0.15	(0.68)	0.64
NJ	0.24	(0.17)	-2.20	(0.92)	-0.86	(0.44)	0.33
NM	0.31	(0.00)	1.73	(0.32)	-0.49	(0.06)	0.49
NV	0.24	(0.05)	1.61	(0.48)	-1.68	(0.19)	0.44
NY	0.07	(0.75)	31.50	(0.54)	0.12	(0.92)	0.28
OH	-0.33	(0.24)	2.35	(0.91)	1.96	(0.04)	0.51
OK	0.28	(0.01)	2.20	(0.44)	-0.39	(0.25)	0.46
OR	0.22	(0.04)	11.20	(0.09)	-0.11	(0.74))	0.30
PA	0.16	(0.27)	-16.60	(0.59)	-0.44	(0.56)	0.28
RI	0.40	(0.00)	2.21	(0.25)	-1.65	(0.00)	0.42
SC	0.20	(0.07)	-2.21	(0.66)	-0.66	(0.17)	0.23
SD	0.26	(0.01)	-0.03	(0.95)	-0.36	(0.31)	0.59
TN	0.13	(0.11)	0.73	(0.90)	-0.12	(0.60)	0.29
TX	0.10	(0.35)	2.30	(0.92)	0.10	(0.86)	0.36
UT	0.15	(0.01)	3.28	(0.23)	-0.30	(0.40)	0.52
VA	0.48	(0.01)	13.20	(0.41)	-2.15	(0.03)	0.52
VT	0.32	(0.00)	0.89	(0.10)	-0.50	(0.08)	0.69
WA	0.39	(0.02)	14.60	(0.19)	-1.98	(0.09)	0.31
WI	0.75	(0.01)	11.40	(0.55)	-2.68	(0.06)	0.37
WV	0.10	(0.02)	-1.77	(0.27)	-0.01	(0.95)	0.60
WY	0.33	(0.00)	-0.35	(0.29)	-0.17	(0.30)	0.77

Notes: p-values between parentheses, (a) for Washington DC, the rule with only debt and cyclical responses also indicates unsustainability of debt

Table 5. Fiscal rule, OLS results, German Länder, 1991-2004.

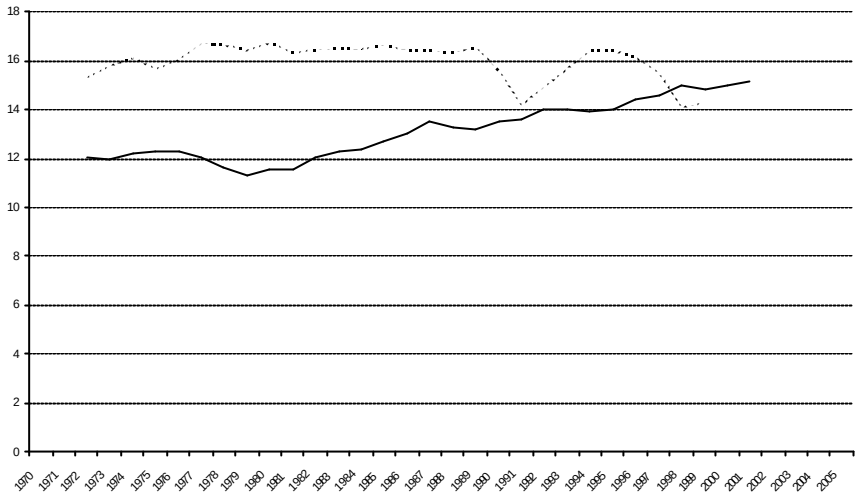
	(1)		(2)		(3)	
	r	p-value	*r*	p-value	*r*	p-value
BW	0.04	(0.64)	0.08	(0.54)	0.08	(0.54)
BY	0.08	(0.21)	0.10	(0.19)	0.10	(0.19)
BB	0.00	(0.76)	0.03	(0.05)	0.00	(0.96)
HE	0.08	(0.03)	0.05	(0.24)	0.05	(0.24)
MV	0.00	(0.71)	0.01	(0.09)	0.00	(0.88)
NI	0.08	(0.37))	0.06	(0.55)	0.60	(0.09)
NW	-0.09	(0.00)	-0.09	(0.00)	-0.09	(0.00)
RP	0.04	(0.00)	0.04	(0.00)	0.05	(0.01)
SL	0.01	(0.11)	0.01	(0.10)	0.01	0.19)
SN	-0.04	(0.01)	-0.01	(0.56)	-0.01	(0.80)
ST	0.01	(0.40)	0.00	(0.72)	-0.04	(0.07)
SH	0.02	(0.00)	0.03	(0.01)	0.03	(0.02)
TH	-0.01	(0.79)	-0.02	(0.53)	-0.05	(0.58)
BE	0.09	(0.02)	0.07	(0.30)	0.00	(0.99)
HB	0.02	(0.01)	0.01	(0.04)	0.00	(0.76)
HH	-0.01	(0.85)	0.00	(0.99)	0.00	(0.99)

Notes: p-values between parentheses.

FIGURES

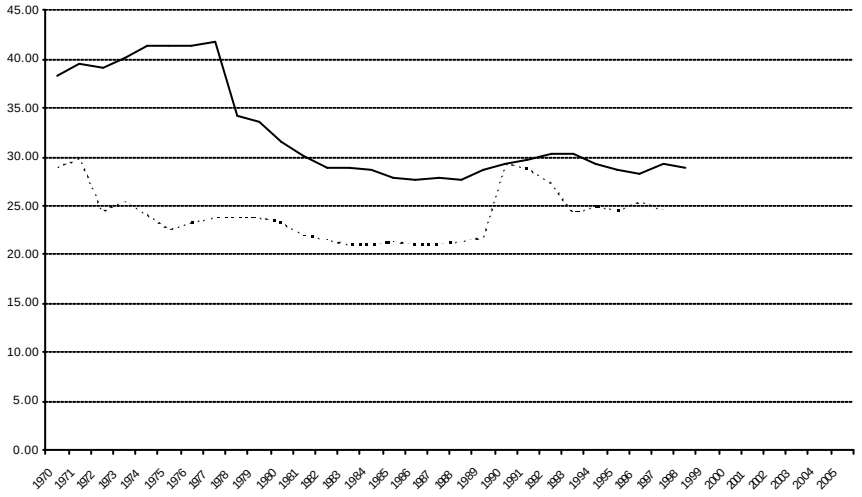
Figure 1. Vertical fiscal imbalance in US states and German Länder.

sub-national own-source revenues (% GDP)



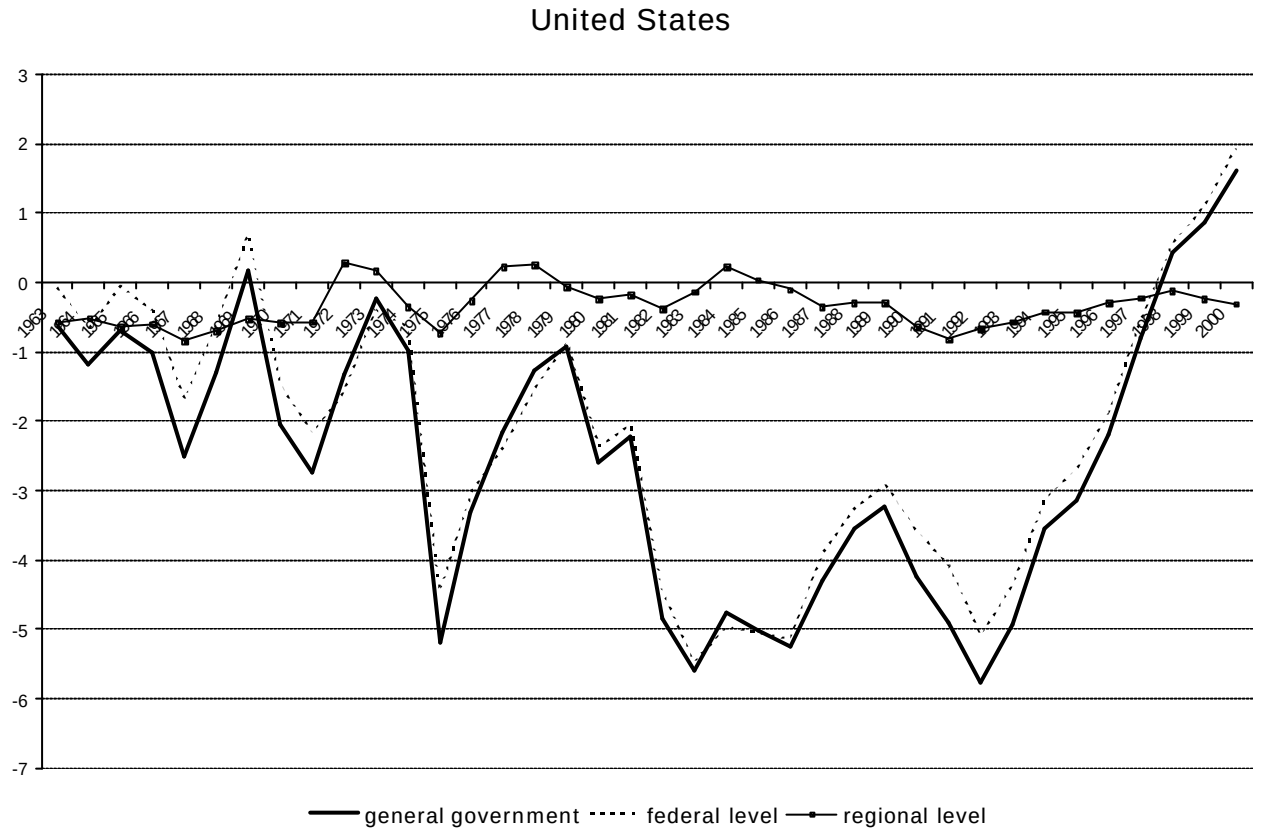
sub-national share of expenditures (% total)

sub-national grants share (% total sub-national revenues)



? ? ? USA ------ Germany

Figure 2. Surplus to GDP ratio for government tiers.



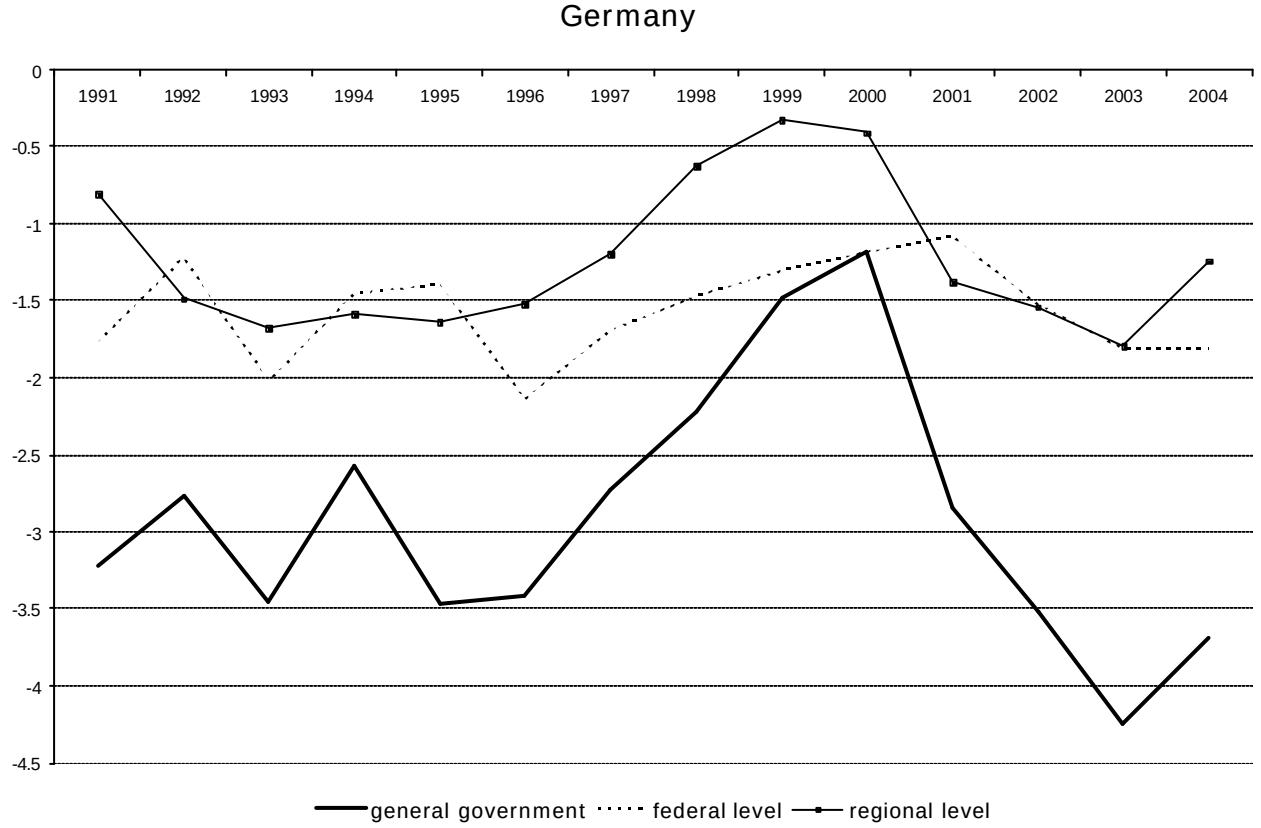
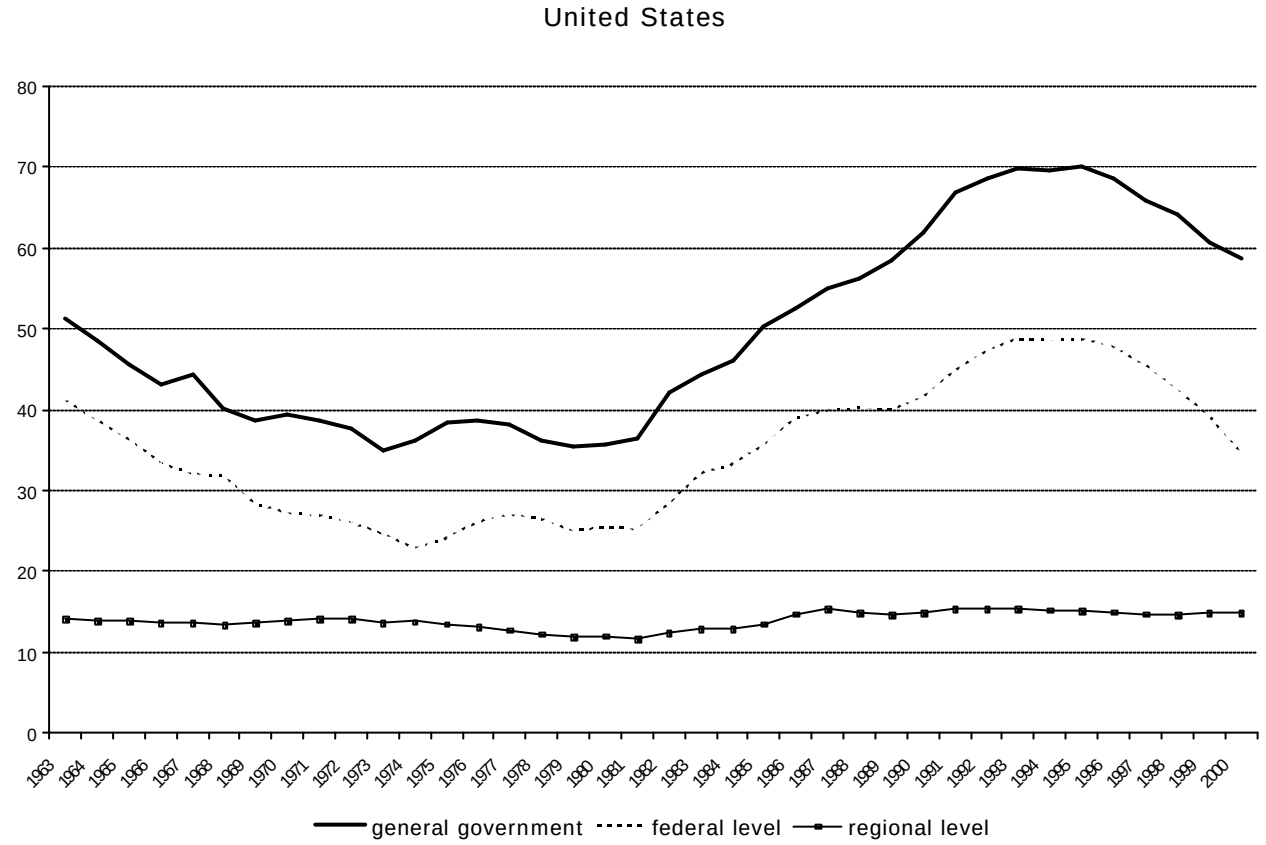


Figure 3. Debt to GDP ratio for government tiers.



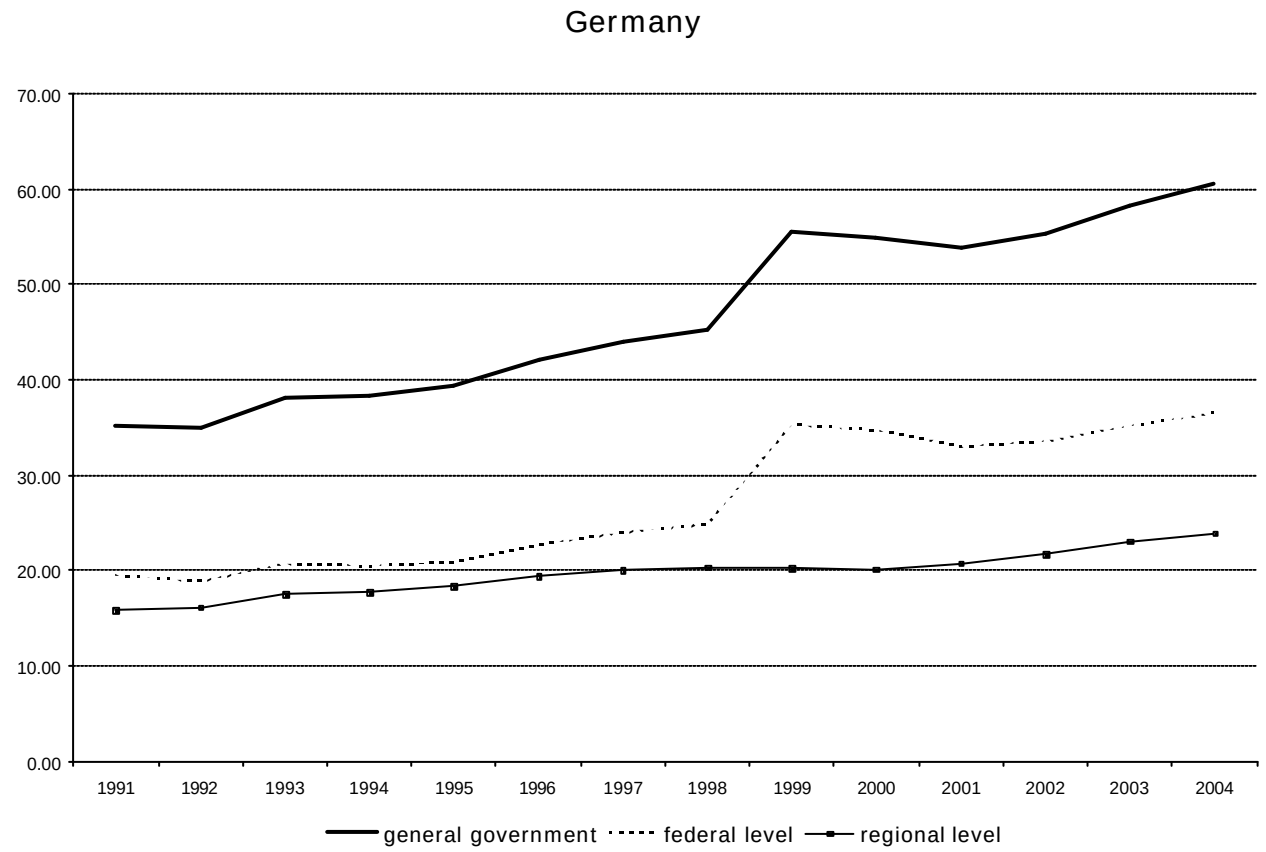
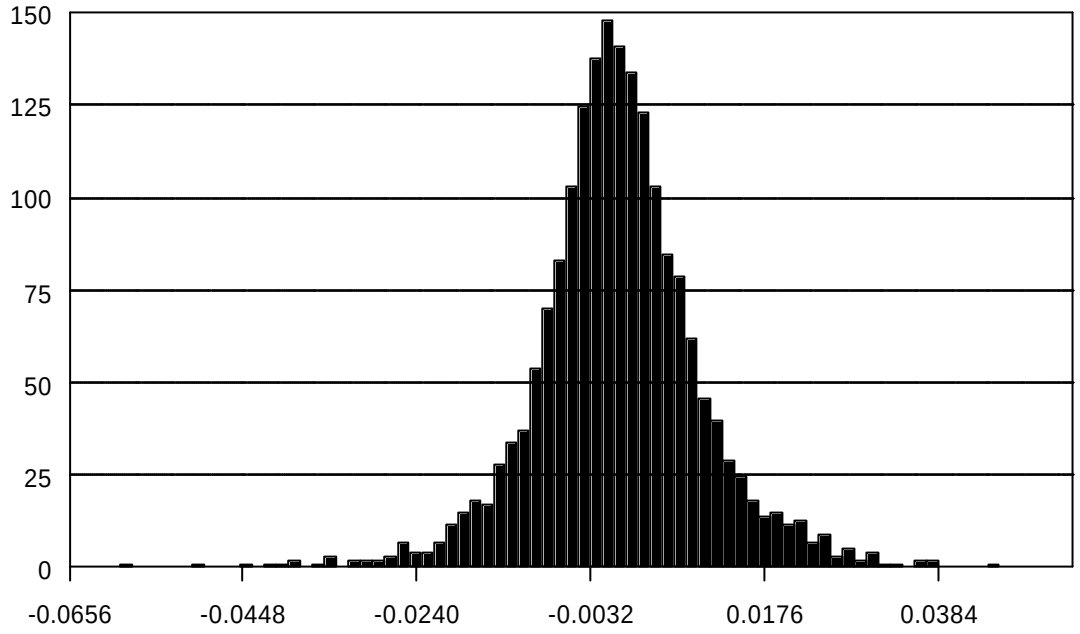


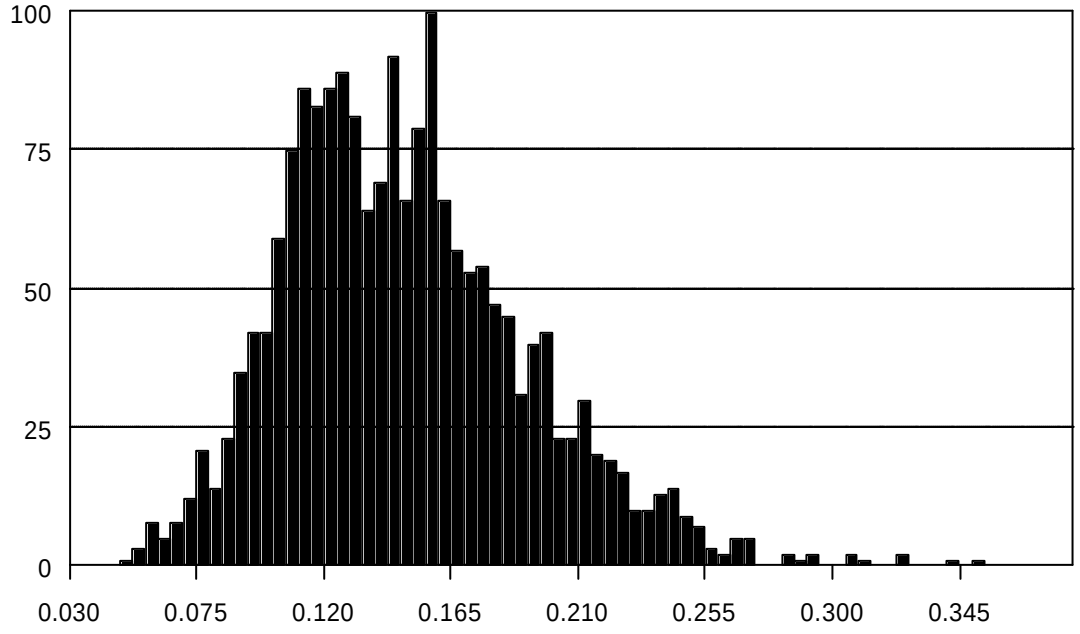
Figure 4. Histogram fiscal data, US-states, 1963-2000.

surplus (% of state GDP)



mean	0.05%	standard deviation	1.10%
maximum	4.99%	skewness	-0.14
minimum	-6.54%	kurtosis	5.60

debt (% of state GDP)



mean	14.22%	standard deviation	5%
maximum	36.80%	skewness	0.68
minimum	3.34%	kurtosis	3.75

Figure 5. State government debt ratio for German Länder (% of state GDP).

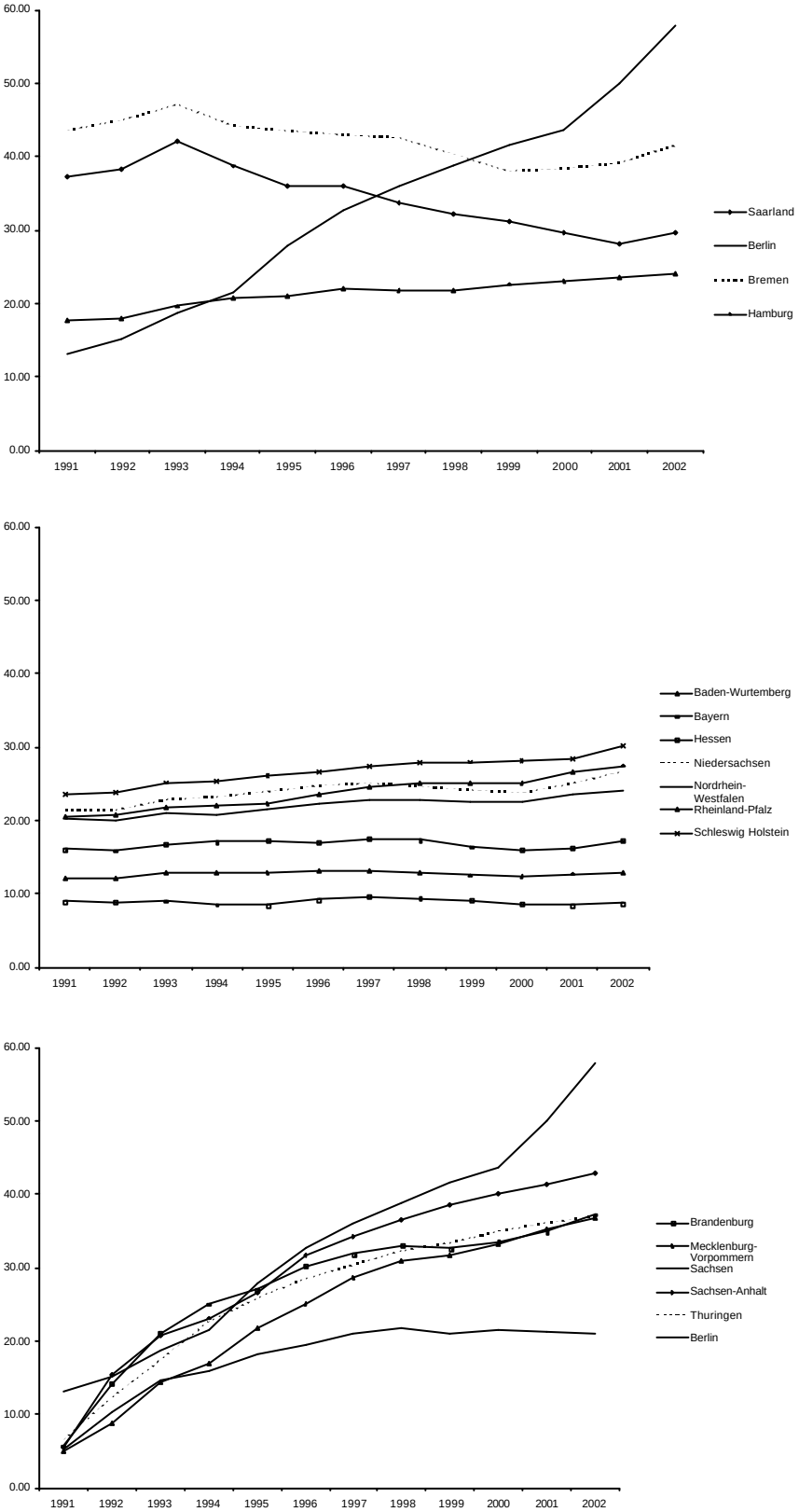


Figure 6. State total net lending ratio for German Länder (% of state GDP).

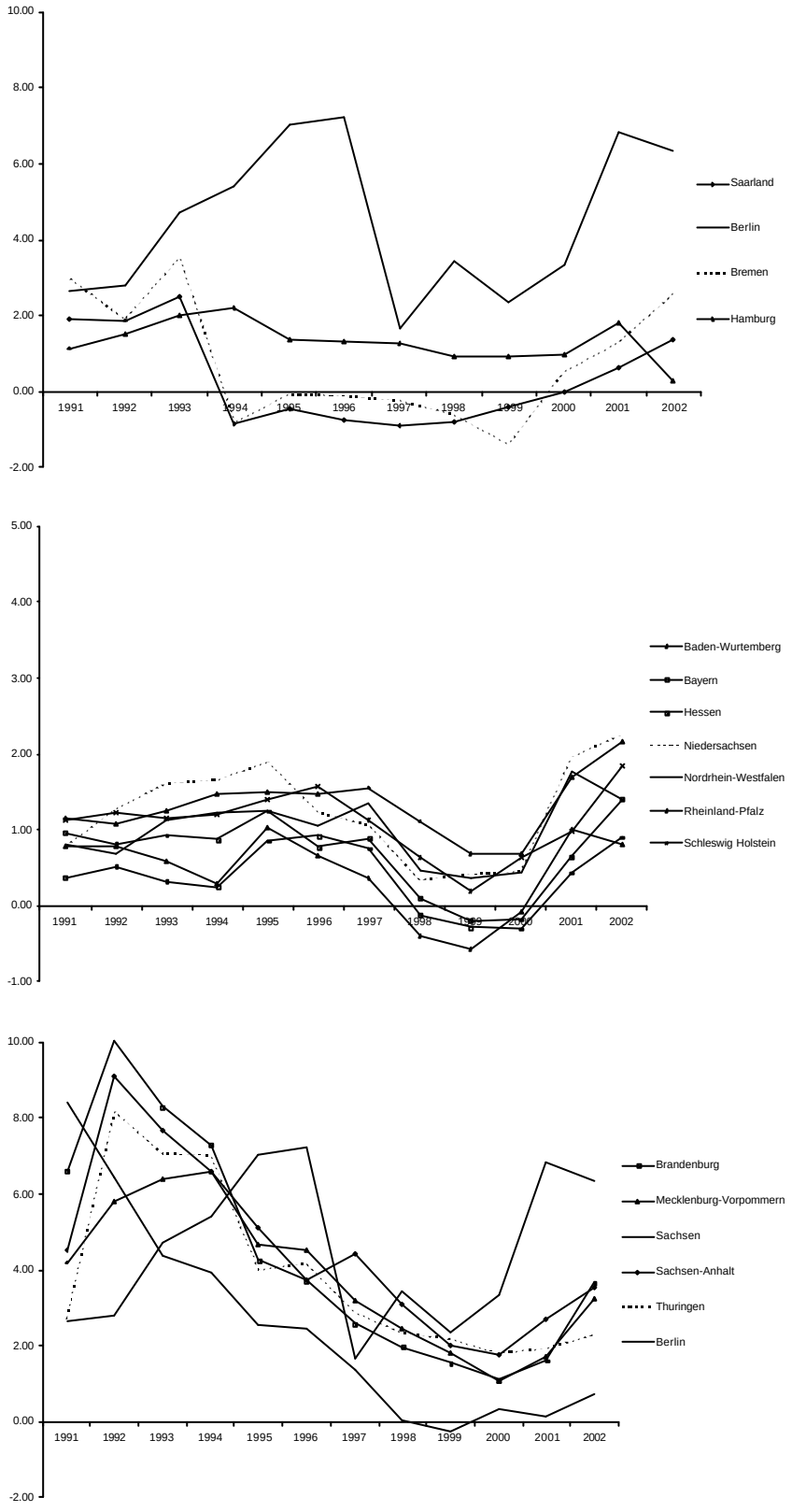
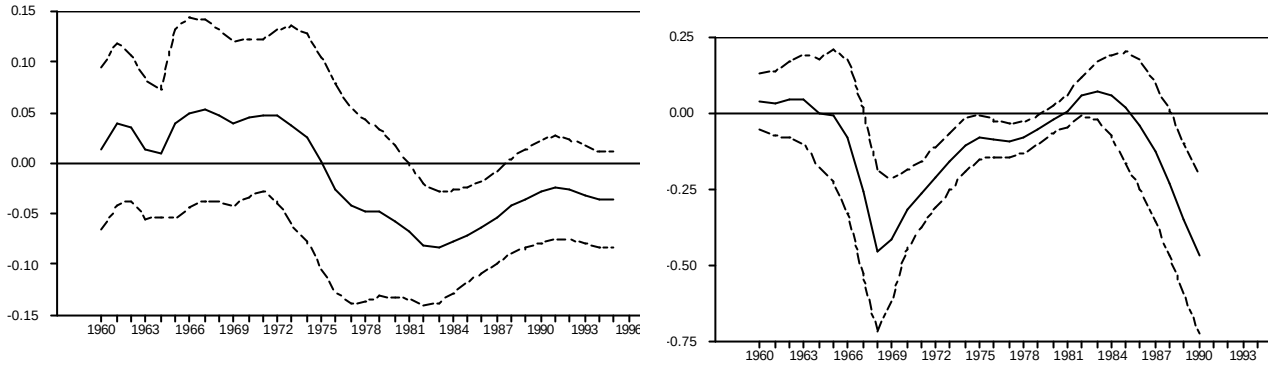


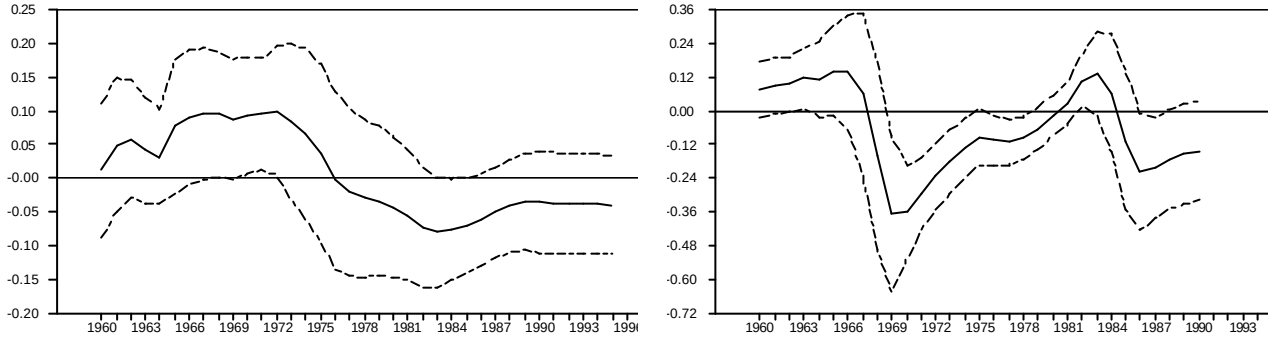
Figure 7. Recursive OLS estimates of fiscal rule (1), United States, 1963-2000.

recursive, window 10 years *sequential, window 15 years*

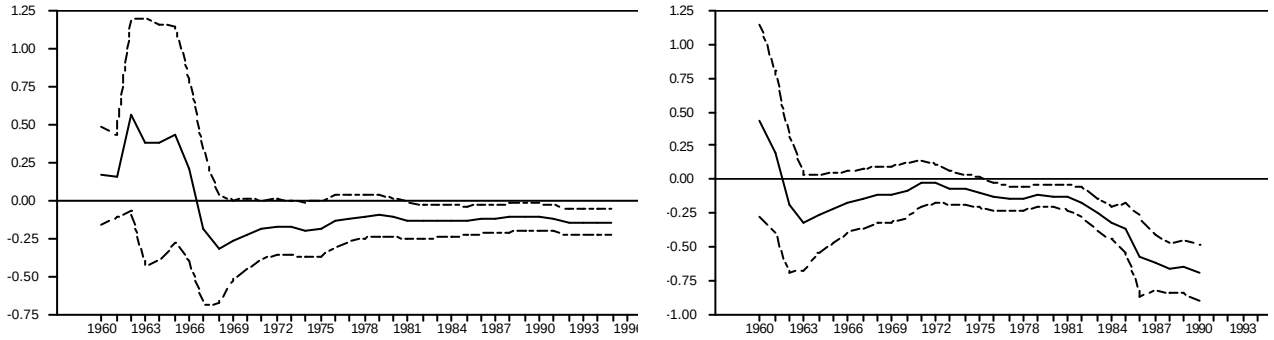
general government



federal government



regional government



APPENDIX A: Data

UNITED STATES

Data on the fiscal policies of the US States and local governments are annual, starting in 1963 and covering fiscal years till 2000. State area finance data for the fiscal years 2001 and 2003 have been collected for state governments only. The dataset contains series on total expenditure, total revenues, total interest on debt and outstanding debt. Total expenditure contains all government expenditure, plus interest due on state and local funds. Total revenues comprise all regional tax revenues, and federal grants to state and local governments.

Data come from the *Annual Surveys of State and Local Government Finances and Census of Governments*, as published in *Government Finances*, by the Bureau of the Census. These fiscal data are statistical measures, and do not represent an accounting statement. A further caveat is that the local government data are obtained from sample-based surveys, except for those years in which a Census of governments was conducted.

The data on gross state product come from the Bureau of Economic Analysis (BEA). There is a discontinuity in the this series at 1997, where the data change from SIC industry definitions to NAICS industry definitions. Gross state product before 1977 come from Oved Yosha's US State-Level Macroeconomic Databank, made available at http://econ.tau.ac.il/research/riskshare. The codes for every state are detailed in the following Table A.1.

Table A.1. Codes for US states.

State		State		State		State		State	
Alabama	*AL*	Hawaii	*HI*	Maine	*ME*	New Jersey	*NJ*	South Dakota	*SD*
Arkansas	*AR*	Iowa	*IA*	Michigan	*MI*	New Mexico	*NM*	Tennessee	*TN*
Arizona	*AZ*	Idaho	*ID*	Minnesota	*MN*	Nevada	*NV*	Texas	*TX*
California	*CA*	Illinois	*IL*	Missouri	*MO*	New York	*NY*	Utah	*UT*
Colorado	*CO*	Indiana	*IN*	Mississippi	*MS*	Ohio	*OH*	Virginia	*VA*
Connecticut	*CT*	Kansas	*KS*	Montana	*MT*	Oklahoma	*OK*	Vermont	*VT*
Dist. of Col.	*DC*	Kentucky	*KY*	North Carolina	*NC*	Oregon	*OR*	Washington	*WA*
Delaware	*DE*	Louisiana	*LA*	North Dakota	*ND*	Pennsylvania	*PA*	Wisconsin	*WI*
Florida	*FL*	Massachusetts	*MA*	Nebraska	*NE*	Rhode Island	*RI*	West Virginia	*WV*
Georgia	*GA*	Maryland	*MD*	New Hampshire	*NH*	South Carolina	*SC*	Wyoming	*WY*

GERMANY

Data on the fiscal policies of the German Länder come from Bundesministerium (2005). Annual series on total expenditure, total and tax revenues, net interest payments, total net lending and government debt are available since German Reunification in 1991 to 2002. In addition, government debt is also available for the former West-German Länder since 1980.

The 16 Länder can be divided in large states ('Flächenländer') and city-states ('Stadtstaaten'). Their codes are detailed in the following table. Data are in millions of euro, and are consolidated to include both local cities and communities. Consolidation across state and local levels makes fiscal data of city-states more comparable to those of the large states. Intra-state payments between state and local governments are excluded. Notice that the latter contain also special funds for bailing out local cities, and are usually conditional and to be repaid.

Table A.2. Codes for German States.

Land	Code
Flächenländer'	
Baden-Würtemberg	BW
Bayern	BY
Brandenburg	BB
Hessen	HE
Mecklenburg-Vorpommern	MV
Niedersachsen	NI
Nordrhein-Westfalen	NW
Rheinland-Pfalz	RP
Saarland	SL
Sachsen	SN
Sachsen-Anhalt	ST
Schleswig Holstein	SH
Thuringen	TH
Stadtstaaten	
Berlin	BE
Bremen	HB
Hamburg	HH