FISCAL SUSTAINABILITY ACROSS GOVERNMENT TIERS: AN ASSESSMENT OF SOFT BUDGET CONSTRAINTS [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 of public debt with a fiscal rule for both the federal and regional government. 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 contrast, both the US federal and state levels 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. Incomplete fiscal autonomy creates fiscal imbalance. This usually implies intergovernmental transfers to complement regional budgets. This reduces incentives for lower tier governments to pursue fiscal discipline. In extreme cases, this may even entail bail-out. Federal fiscal systems are therefore complemented with control systems on the sustainability of public finances at lower tiers.

The variety of fiscal arrangements in different countries makes it hard to examine the interaction between regional and federal policies. Some recent studies have made some progress at the theoretical level (Rodden *et al.*, 2003). These models do not grasp all aspects of fiscal federalism, however. Empirical studies that look into the sustainability of different federal fiscal systems are fraught with a major identification problem. Bail-outs are not necessarily an indication of prolonged unsustainable fiscal policies. But the absence of bail-out does not necessarily imply that the fiscal system is solvent either. Basically, the federal and regional governments may anticipate fiscal problems with additional transfers. Expectations of bailouts are what matter for sustainability (Bordignon, 2006). These expectations are hard to identify in the budget data we observe.

However, given that additional transfers have to be financed by at least one tier of government, we can use the aggregate deficit and debt position as an indicator of sustainability. We extend the usual approach in the literature to analyse fiscal sustainability –a positive reaction of the fiscal surplus to public debt (Bohn, 1998) –to different tiers of government. We test fiscal sustainability for the federal and regional governments in two decentralised countries with a similar degree of vertical imbalance, the US and Germany. 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. The entire fiscal adjustment occurs via federal government debt. The federal government cannot induce lower tiers to react in a stabilising way to debt. We argue that the different set up of the fiscal system in the US and Germany is responsible for these different responses. The US federal government provides most of the transfers received by state governments. German Länder are instead mainly sharing revenues in the horizontal *Finanzausgleich*, whereas the federal government has little vertical transfers at its disposal to make Länder internalise the spillover on aggregate debt. This set up explains the lax application of fiscal rules in Germany.

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1. INTRODUCTION

The ongoing process of shifting political powers to both supra-national and regional levels world-wide urges some insight in the process of fiscal decentralisation (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. 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 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. This reduces incentives for lower tier governments to pursue fiscal discipline. In extreme cases, this may even entail bail-out. Federal fiscal systems are therefore complemented with control systems on the sustainability of public finances at lower tiers.

The variety of fiscal arrangements in different countries makes it hard to examine the interaction between regional and federal policies. Some recent studies have made some progress at the theoretical level (Rodden *et al.*, 2003). These models do not grasp all aspects of fiscal federalism, however. Empirical studies that look into the sustainability of different federal fiscal systems are fraught with a major identification problem. Bail-outs are not necessarily an indication of prolonged unsustainable fiscal policies. But the absence of bail-out does not necessarily imply that the fiscal system is solvent either. Basically, the federal and regional governments may anticipate fiscal problems with additional transfers. Focussing on bail outs overlooks the strategic interactions between different tiers of government. Expectations of bailouts are what matter for sustainability (Bordignon, 2006). These expectations are hard to identify in the budget data we observe.

In the fiscal federalism literature, the problem of consolidation of public finances is commonly considered from the sub-national perspective. However, given that additional transfers have to be financed by at least one tier of government, we can

use the aggregate deficit and debt position as an indicator of sustainability. We test sustainability with a fiscal rule in which the budget surplus responds to debt developments (Bohn, 1998). This test has become rather popular for assessing fiscal sustainability, but the analysis usually applies to general government data. We disaggregate the analysis to different tiers of government. We test both a rule for the federal government and for a panel of regional fiscal policies in order to get a more detailed insight in the reaction of different government tiers.

We test fiscal sustainability for the federal and regional governments in two decentralised countries with similar fiscal institutions. Both US states and German Länder are subject to budget rules, but are able to issue debt autonomously. The federal system in both countries is characterised by a similar degree of vertical 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.

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 federal government debt. The federal government cannot induce lower tiers to react in a stabilising way to debt. We argue that the different set up of the fiscal system in the US and Germany is responsible for these different responses. The US federal government provides most of the transfers received by state governments. German Länder are instead mainly sharing revenues in the horizontal *Finanzausgleich*, whereas the federal government has little vertical transfers at its disposal to make Länder internalise the spillover on aggregate debt. This set up explains the lax application of fiscal rules in Germany.

The paper is structured as follows. In section 2, we develop the test for the sustainability of public finances, and show how the identification problem can be overcome. 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 and argues that the financing structure of the fiscal system has implications for the consolidation efforts of different tiers of government. Concluding remarks follow in section 5.

2. TESTING SOFT BUDGET CONSTRAINTS ACROSS GOVERNMENT TIERS

Devolution of public policies may create problems of fiscal imbalance for government finances. Federal fiscal systems are therefore complemented with control systems on the sustainability of public finances at lower tiers. Fiscal arrangements between the first tier and lower levels of government have been set up in a variety of ways in different countries. In existing federal states, different solutions have been implemented, which range 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). A combination of institutional, political and economic factors probably accounts the large differences we observe in the set up of fiscal federations. Some recent theoretical studies have made some progress in examining the interaction between regional and federal policies. However, these models cannot grasp all aspects of fiscal federalism (Rodden *et al.*, 2003).

The problem of fiscal unsustainability common to all federal countries is the incompatibility of the constitutionally determined division of spending tasks, and the sharing of (tax) revenues across different government levels. The concern is with the incentives that the fiscal system in federal states gives to lower tier governments to indulge in unsustainable policies. Usually, the problem of a soft budget constraint occurs when regional governments have little reason to adjust the budget to satisfy the intertemporal 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 sometimes co-decide on tax bases and rates. If economic or political 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 havoc and the build-up of regional debt. Moreover, regional budgets are usually complemented with (vertical) transfers from the central government or (horizontal) transfers from other regions. These additional grants can further soften the regional budget constraint.

The empirical analysis of sustainability of different federal fiscal systems is scant. The main reason is that disentangling the effect of different fiscal systems on aggregate fiscal sustainability is fraught with difficulties (Bordignon, 2006). The strategic

behaviour of both central and sub-national tiers of government does not allow the identification of a sustainability problem at regional level. 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. Hence, a bail-out is not necessarily an indication of unsustainable fiscal policies. But the absence of bail-outs does not imply that the fiscal system is solvent either. Basically, the federal and regional governments may anticipate fiscal problems with additional transfers long before. Expectations of bailouts are what matter for sustainability (Bordignon, 2006). These expectations are hard to identify in the fiscal data we observe.[1]

Most studies focus on cases of regional default and bailout (Rodden *et al.*, 2003). However, the identification problem occurs because the focus is on regional public finances. Expectations of bailout and the consequences for sustainability of regional public finances are indeed hard to detect as we need to uncover the incentive structure of the regional government. However, if we consider sustainability from the aggregate level, we can avoid making assumptions on how the fiscal system affects the expectations of bailout by looking into the evolution of general government deficits and debt. As additional transfers have to be financed by at least one tier of government, we can use the aggregate deficit and debt position as an indicator of sustainability. A fiscal system is then characterised by a soft budget constraint if at least one tier of government does not need to face the consequences of the creation of public debt and the sustainability of its own public finances.

To that end, we recast a test for debt sustainability in terms of a fiscal policy rule *à la* Bohn (1998) that accounts for the interaction between various tiers of government. 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. Alternative tests of the intertemporal budget constraint have been suggested in the literature. These are usually based on the time series properties of deficit and debt variables. 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

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[1] Bordignon and Turati (2005) isolate these expectations for regional Italian health expenses using EMU entry as a natural experiment. Heppke-Falk and Wolff (2007) identify moral hazard of investors in the German regional bond market.

the intertemporal budget constraint (Bohn, 2007). A robust alternative test for sustainability can be based on the response of the fiscal surplus s_t to initial public debt b_t^*, as in (1):

$$s_t = \rho b_t^* + \mu_t.\qquad(1)$$

A strictly positive response of the government to debt developments is a sufficient condition for fiscal policy satisfying the intertemporal budget constraint (Bohn, 1998). The basic intuition is that $\rho > 0$ in (1) implies that future debt is reduced by factor $(1-\rho)^n$ at horizon n indicating compliance to the budget constraint. The strength of the fiscal rule lies in its robustness.[2]

We argue that we can extend the test to different tiers of government, and infer on a problem of soft budget constraints. In this way, we avoid making assumptions on the expectations of bail-out. By testing the response of surpluses to debt, we may disregard the strategic interactions between tiers of government. The fiscal system is only a latent variable in our tests.

In particular, in a reaction function like (1), a strictly positive ρ response of the general government surplus to the debt stock of the general government is a sufficient condition for aggregate sustainability. Sustainability could still be compatible with a soft budget problem if at least one tier of government takes on the burden of debt of another government level. Direct bail-out or government transfers by one tier may compensate for the debt build-up of another tier of government. The problem of soft budget constraint eventually depends on the unsustainability of one or more tiers of government. Hence, we need to look into fiscal rules for different government levels, and their respective adjustment parameters ρ. We need some further restrictions to arrive at a testable fiscal rule. Let us assume there is one federal government, and N-1 regions in the country. We denote variables for the federal government level with subscript '1' and the regions by 2, ... , N. The condition (2)

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[2] The only necessary assumptions are that the data generating process for fiscal policy is stationary and ergodic. The residual μ_t is a composite of other determinants that in the aggregate are assumed to be bounded as a share of GDP. It can be shown that that $\rho > 0$ also holds for fiscal policies that react in a non-linear way to debt (Bohn, 2005). Likewise, it is sufficient that the condition applies infinitely often within sample (Canzoneri *et al.*, 2001). Of course, $\rho > 0$ is not a necessary condition and hence there exist fiscal policies that violate this condition but still are sustainable.

decomposes the restriction $\rho > 0$ for the different tiers,

$$\rho = \rho_1 + \sum_{i=2}^{N} \rho_i > 0 \qquad (2)$$

We can test this restriction in a system estimate of fiscal rules for the federation and all regions jointly. Fiscal policy will be sustainable if (2) holds. A problem of soft budget constraints is present if the federal government consolidates more than the regions consolidate jointly. In other words, if we estimate a system like (3), then

$$\begin{cases} s_{1,t} = \rho_1 b_t^* + \mu_{1,t} \\ \qquad \dots \\ s_{N,t} = \rho_N b_t^* + \mu_{N,t} \end{cases} \qquad (3)$$

the condition $\rho_1 > \sum_{i=2}^{N} \rho_i$ is sufficient to have a problem of soft budget constraints, even if (2) holds.

Except in a few countries that have devolved more powers to regions (e.g. Belgium), there are no agreements to share the historical debt burden of the federation. Usually, fiscal control mechanisms that are written in the constitution require regional governments to pay only attention to its own debt burden. Hence, we might rather test a fiscal rule (4) for each tier of government individually:

$$s_{i,t} = \rho b_{i,t}^* + \mu_{i,t} . \qquad (4)$$

In this case, every tier of government sets its surplus in response to its stock of public debt. The condition that

$$\rho_i > 0 \qquad i = 1,...,N \qquad (5)$$

implies that every tier of government runs a sustainable fiscal policy. Consequently, there will be no problem of soft budget constraints. This is a very strong restriction, as

the fiscal system imposes a hard budget constraint on all tiers.[3]

In order to focus on the relation between the federal and the regional governments, a weaker condition than (5) can be sufficient for the absence of a soft budget constraint. It is sufficient that the federal government runs a sustainable policy, and that on average the reaction of all regional governments is sustainable to have a hard budget constraint. I.e., we test the condition that $\rho_1 > 0$ with fiscal rule (1) for the federal government, and the condition that regions run sustainable policies in a panel version (4) of the fiscal rule.

By splitting up the contribution of the reaction of the general government into the response of both federal and regional governments, we can attribute the burden of consolidation to a particular tier of government. Moreover, we shed some light on how to spread the burden of fiscal adjustments across various tiers of government to maintain fiscal sustainability at the aggregate level.[4]

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 estimate the rule by OLS for the general government, i.e. the consolidated budget of both 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 federal government. For the regional governments, we apply panel OLS estimates of the fiscal rule for all regions jointly. This 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 control for this heterogeneity by subsuming these in the fixed effects.

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[3] The restriction $\rho_i > 0$ with $i = 2,...,N$ would not require the federal government to run sustainable fiscal policies. At first sight, it may seem odd that regions would bail-out the central government. There are two reasons why this might happen though. First, a few (con)federations exist of strong regions and a weak center. Switzerland and Brazil are examples. Second, the federal government often has privileged access to central bank financing in the common currency, and thus faces a softer budget constraint.

[4] 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.

The setting of fiscal policy is determined by many other factors of course.[5] Fiscal rules have not only been used to assess fiscal sustainability, but to gauge 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. Hence, we could rewrite the fiscal rule (1) as follows:

$$s_t = \rho b_t^* + \alpha y_t + \varepsilon_t. \qquad (6)$$

We specify all fiscal variables in ratios to GDP. We will take as the initial debt stock b_t^* the lagged debt ratio to GDP. As for the cyclical indicator, we take the growth rate of GDP, as proxied by the first log difference of real GDP.

3. SHARING THE BURDEN OF DEBT

3.1.   The fiscal system in the US and Germany

The US and Germany provide a good testing ground for this hypothesis. Both are federal countries with rather similar institutional settings for fiscal policy. 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.[6] 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. 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

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[5] We condition our analysis on some alternative 'political' explanations for unsustainable public finances, such as political affinity of regions and the federal government, political party in power, coalition formation, size of the region etc.. Bordignon (2006) provides an overview of some empirical results in this area.

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

the equalisation of living conditions.[7]

The structure of regional budgets is similar in both fiscal systems. US states and German Länder are responsible for about 40% of total government spending (figure 1a). While this share has remained constant over the nineties, US states have been increasing their relative importance and now account for half of all government spending. A good summary indicator of the dependence of regions on transfer financing is vertical fiscal imbalance. The ratio of received transfers on total regional government spending reflects the gap between the sub-national government's own revenue and its expenditure responsibilities.[8] Regional budgets in the US and Germany are funded by grants to a similar degree (figure 1b). Nonetheless, while the majority of transfers to US states 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.[9] These are further complemented with vertical transfers from the federal level to further reduce economic disparities and finance specific tasks.[10] A second consequence of fiscal homogeneity is a strong degree of fiscal harmonisation that reduces the possibility of Länder to adjust tax revenues. US states can count on nearly 80% of adjustable tax revenues and share tax agreements for about 20%. In contrast, German Länder have full competence over about 20% of tax revenues (figure 1c).

3.2. Data

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[7] Fiscal crises in other Länder 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.

[8] Various studies have found that the probability of a bailout depends on this indicator (Singh and Plekhanov, 2005).

[9] 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 are 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.

[10] 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, smooth 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.

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.[11]

Data on German fiscal policies come from different sources. General government series are from the OECD. Data for the central government are available from different publications of the *Statistisches Bundesamt*. Regional budget data stem from various sources. Fiscal data are consolidated across Länder and towns. Data cover the sample 1970-2005. The Reunification of Germany urges us to consider different sample periods. We control for the shift in data with an impulse dummy and a time trend as of 1991. In addition, we will consider two different periods: 1970-1990 for the old Länder; 1991-2005 for both new and old Länder. The former Eastern German Länder have participated in the *Finanzausgleich* system since 1994 only. We finish the sample in 2005 as a major reform of the German fiscal system has taken place.

We plot in figure 2a the net lending ratios to GDP for the different government tiers in the US. 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 2b). State debt ratios hover around 15 per cent of GDP. A closer look at the state deficits and debt ratios shows a more varied picture. We have plotted histograms for both the net lending and debt ratio for the panel of states (figure 3a-b). 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

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[11] For a detailed description of variables and data sources, see the Appendix.

cent) is still low in comparison.[12] Apparently, state fiscal policies are rather well behaved.

German regional policies are as important as the federal budget in determining the overall budget balance. The aggregate deficit of the Länder has been rather constant since the seventies at about 1%. Most of the variation in the balance of the general government is due to changes in the fiscal stance of the federal government (figure 4a). These reflect the strong spending boost of the Brandt government, German Reunification and the consolidation since entry in EMU. Both the federal government and the Länder contribute in almost equal proportions of 30 per cent to the overall debt position. German Reunification has been nearly completely financed by federal debt issues. In recent years, the federal government contributes about 10 per cent more than the regional tier (figure 4b).

We have displayed the deficit ratios for the German Länder in figure 5a. 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. The first characteristic concerns the bailed out states. The peak in deficits 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 deficits. Ratios have bounced back in recent years. The size of the state does not seem to matter much for the deficit. A second striking feature of figure 5a is the dramatic fall in Berlin's budget surplus. This is part of a phenomenon observed in all former Eastern-German Länder. Deficits quickly shot up directly after Reunification.[13] 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. In contrast to Berlin, most former Eastern German states have been able to contain deficits to a level that is only slightly higher than in the old Länder. A final feature of the fiscal behaviour of lower tiers is the build-up of deficits during the eighties in old Länder. After Reunification, these Länder have kept under control deficits, but in recent years deficits have begun to grow again in all Länder.

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[12] 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.
[13] The only exception here is Sachsen.

Hence, the steady position of debt in a range of about 10 to 25 per cent across Western German Länder has recently given way to large increases (figure 5b). The debt evolution highlights differences in deficits in the Eastern and Western German Länder. Public debt levels in the Eastern Länder seem to converge to German average of about 35%. Berlin and Bremen, and to a lesser extent Saarland, are accumulating ever larger debt.[14]

4. RESULTS

The estimates of the baseline fiscal rule (1) on general government data confirm some of the earlier insights in the literature. US fiscal policy is sustainable over the period 1963-2000 (Table 1). The response is somewhat weaker than what other studies find. Most other studies find a response of the primary surplus that is nearly the double. Bohn (2005) argues that a weak debt response is due to an omitted variable problem. This could be problematic, considering the rather low explanatory power of the model. However, the result seems rather robust: the reaction coefficient does not change once we allow for a cyclical response of the budget in the fiscal rule (6). In addition, we consider a much more homogeneous sample period than Bohn (2005). Nevertheless, even over the period 1963-2000 there is some evidence of significant breaks in the debt response (Table 1). The Andrews tests indicate a significant break in 1967, which coincides with the increasing expenses of the Vietnam War. However, if we control for possibly varying volatility in the subsamples before and after this break (Stock and Watson, 2003), the test locates the break in 1994. This heralded the start of the long economic boom and the consolidation of public debt by the Clinton Administration. As either break is located at the end of the sample, we cannot explicitly model the differences in debt response.

For Germany, the response of the government to debt is insignificant instead. With a control for a cyclical response of the budget, there is some weak evidence that the budget of all government tiers together becomes sustainable. This is in line with the weak or insignificant responses that several other studies have found on general government data (Ballabriga and Martinez-Mongay, 2005). One might suspect that Reunification profoundly changed the fiscal system. Break tests on the fiscal rule show the relevance of the data shift. Galì and Perotti (2003) or Greiner and Kauermann

[14] Berlin applied for federal government intervention in October 2006, but its request was repealed by the Federal Constitutional Court.

(2007) find weaker responses to debt over the nineties. However, if we condition the break test on the data shift (and control for changes in volatility in the subsamples), then there is evidence of a change in debt responses in the early eighties. This break is only precisely estimated for the fiscal rule (6) that allows for a cyclical reaction. This break is due to the large changes in fiscal policy in the seventies. Government spending (mainly on social transfers) boomed under the Brandt government in 1976. Fiscal policy in the eighties was instead aimed at a gradual consolidation. We henceforth continue with a split up of the sample in the periods 1970-1990 and 1991-2005, and find a difference in debt consolidation too. The debt response is insignificant for West-Germany, whereas there is some weak evidence that German fiscal policy became more sustainable afterwards after Reunification. The explanatory power of the fiscal rule is rather weak: we find a weak debt response only if we include a cyclical reaction of the surplus. Note that the finding of weakly procyclical policies has been a common finding for German fiscal policy.

The responsibility of different government tiers for the aggregate debt responses is different in the US and Germany. We test the sustainability of the federal government in all states or Länder jointly with system (3). Table 2 shows that the US federal government responds only weakly to aggregate public debt. Unsurprisingly, given that the structural breaks we detect for the general government are related to activities of the federal government (defence), we find a similar structural break in 1967 or 1994. In contrast to the weak debt response of the federal government, consolidation in the US states is much stronger. Only 3 out of 50 states do not contribute to the stabilisation of the aggregate debt burden. We strongly reject that the sum of regional stabilisation coefficients is smaller than the stabilisation effort of the federal government. Hence, not only is US fiscal policy sustainable, there are in addition no soft budget constraints that shift the burden of stabilisation to other tiers of government.

Actually, government tiers in the US fiscal system face an even harder budget constraint. We test fiscal rules separately for the federal government and the panel of US regions. The federal government's stabilising response to federal debt is strong and significant (Table 3). The stabilising response to debt remains if we control for a cyclical reaction of the federal budget, albeit it is weak.[15] At the same time, the

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[15] In contrast to Wibbels and Rodden (2006), the cyclicality of regional budgets is low. Cyclical variations are non-existent (or even procyclical) in the German Länder budgets.

reaction of state fiscal surpluses to debt is equally strong to their respective state debts. Hence, we would argue that fiscal responsibilities in the US fiscal system are clearly set out such that the federal and state governments consolidate their own debt. I.e., budget constraints on US states are hard.[16]

In contrast, the German fiscal system faces some more problems. Fiscal relations are less well managed by the federal government and the Länder. The joint reaction of both government tiers to aggregate debt indicates widespread fiscal problems (Table 4). The federal government does not react in a significant way to public debt developments, and half of the Länder do neither. The debt response of the regional governments is not obviously stronger than that of the federal government. Hence, fiscal policy is unsustainable but it is not clear that this owes to a problem of soft budget constraints. Fiscal problems have not started with Reunification, nor owe these to large deficits in the new Länder. The fiscal system ran into trouble for the former West-German Länder already. If anything, the problems of unsustainability of German public finances were even more widespread before Reunification. The federal government was running down surpluses in the wake of increasing debt. In addition, only two Länder would contribute to debt stabilisation whereas a majority of old Länder does so after 1991. In contrast, only two out of six Länder run unsustainable policies. For none of the sample periods is it possible to reject that the German federal and regional governments face a hard budget constraint.

As the aggregate debt burden may hides a shift of liabilities from one government tier to the other, we test the fiscal rule for the federal government alone (Table 5). This shows the lack of a significant response to federal debt. The few observations available in the subsamples make inference more awkward. One might read the shift from a negative to a positive response after 1991 as evidence of a greater awareness of the sustainability problem since Reunification. The Länder ignore fiscal sustainability altogether (Table 6). We find a significant negative reaction of the Land's surplus to an increase in Land debt if we control for the cyclical reaction of Land budgets. And whereas in the pre-Reunification period, West-German Länder did not respond in any way to public debt, we find that these Länder have seriously been running down surpluses since. Surprisingly, Länder budgets have been procyclical since 1991, but were able to stem cyclical fluctuations before Reunification. In

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[16] The estimation of a fiscal rule for every state individually confirms positive debt responses (results not reported).

contrast, the new Länder have set surpluses to counter debt rises in their region. To sum up, there is substantially more heterogeneity across the German Länder.[17] It is not clear on statistical grounds that there is a soft budget constraint problem though.

The reason for the strong differences in debt responses in the US and Germany could be of economic or political kind. Given the strong similarities of both fiscal systems, one nevertheless wonders about the strongly different outcome in terms of debt. Pork barrel politics could happen both in US states or German Länder. Government spending benefits local citizens but the costs in terms of tax increases are borne by the common pool of US or German tax payers. Nonetheless, the debt problem seems to be intrinsic to the set up of the German fiscal system: there has been no major shift in sustainability with Reunification. Rodden *et al.* (2003) attribute the lack of fiscal discipline in Germany to the cooperative approach to fiscal federalism. I.e., the federal and Land governments overlap in their spending competences, and share revenues on common tax bases with a strong degree of harmonisation of tax rates. Moreover, a large share of spending and the majority of tax decisions are made after an agreement has been reached between the federal government and all Länder.

Cooperative fiscal federalism substantially complicates the setting of federal and regional budgets as spending and revenue sides become rather rigid. 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. In particular, Laubach (2006) hypothesises 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. In this way, the central government internalises the effects of regional fiscal policies in its grants scheme. The internalisation of the effects on the aggregate debt position renders the regional budgets more responsive to debt build up. 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. According to Laubach (2006), specifically earmarked or matching grants have increased the power of the US central government over spending decisions of states. Similarly, a gradual tendency to co-finance regional

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[17] Many Länder disregard sustainability of their debt at the regional level (results for individual fiscal rules are not reported).

tasks of Länder has increased the bargaining position of the government in Berlin (Seitz, 1999).

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. In particular, we examine whether fiscal systems are subject to a problem of soft budget constraints. We test fiscal sustainability for central and regional governments with fiscal rules. We extend the usual approach in the literature to analyse fiscal sustainability to consider soft budget constraint problems between different tiers of government.

We analyse fiscal behaviour of different government tiers in the US and Germany. Institutional settings and the fiscal structure are rather similar in both countries. Spending capacity and the degree of vertical imbalance are rather similar in the US and Germany. However, horizontal transfers are more important for regional budgets in Germany. Länder also have less political power over their tax bases. 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.

This paper is a first step in the empirical analysis of fiscal relations between different government tiers. We have abstracted from many issues. First, the specification of the fiscal rule is simple. Interesting insights can be derived from a reaction of different budget items. Adjustments on the spending or on the revenue side have rather different implications. There is much evidence on the 'flypaper' effect of additional central government transfers to lower tiers. In particular, the consolidation effort may vary in response to own revenues, vertical grants or horizontal transfers. This would shed more light on the nature of the soft budget constraint. More detailed data are necessary to this end. Second, the empirical analysis ignores any spillover effect of

fiscal policy across regions. Several authors have shown the importance of tax competition and spending reductions at lower tiers of government (Brückner, 2003). Similar evidence at first and second government tiers is more limited (Redoano, 2007). Finally, fiscal transfer systems are mostly designed to address a problem of redistribution across regions. Transfers are permanent and may not always lift the region out of economic havoc (Obstfeld and Peri, 1998). Empirical work in this area is still in its infancy as most theoretical models cannot address this issue in a satisfactory way (Bordignon, 2006).

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TABLES

Table 1. Fiscal rule, (1) and (6), general government: $s_t = c + \rho b_{t-1} + \alpha y_t + \varepsilon_t$

	US		Germany					
	1962-2000		1971-2005		1971-1990		1991-2005	
	(1)	(6)	(1)	(6)	(1)	(6)	(1)	(6)
ρ	0.06	0.05	0.01	0.14	0.01	0.21	0.14	0.15
	(0.02)	(0.03)	(0.69)	(0.06)	(0.95)	(0.29)	(0.14)	(0.15)
α		0.14		-0.81		-0.12		-0.26
		(0.12)		(0.06)		(0.27)		(0.74)
obs	38	38	35	35	20	20	15	15
R^2	0.17	0.20	0.07	0.13	0.01	0.08	0.18	0.19
	1967	1991	1982	1976	-	-	-	-
AQ	(0.08)	(0.27)	(0.30)	(0.25)				
AP	(0.03)	(0.21)	(0.29)	(0.17)				
Bai	1966	1994	1983	1981				
	(0.00)	(0.00)	(0.00)	(0.00)				
	[-;-]	[-;-]	[1976;2000]	[1979;1983]				

Notes: heteroscedasticity and autocorrelation robust OLS estimates; AQ and AP indicate the corrected Andrews Quandt and Andrews Ploberger break date for the fiscal rule; the breaktest of Bai is Bai (1997), with the 33% confidence interval.

Table 2. System of fiscal rules (3), US states, 1963-2000.

state	ρ	p-value	state	ρ	p-value
federal	0.03	(0.13)			
AK	0.27	(0.01)	MT	0.07	(0.00)
AL	0.02	(0.01)	NC	0.03	(0.00)
AR	0.05	(0.00)	ND	0.05	(0.00)
AZ	0.04	(0.00)	NE	0.08	(0.00)
CA	0.03	(0.02)	NH	0.04	(0.00)
CO	0.05	(0.00)	NJ	0.04	(0.00)
CT	0.01	(0.22)	NM	0.03	(0.10)
DC	0.05	(0.00)	NV	0.02	(0.09)
DE	0.07	(0.00)	NY	0.04	(0.01)
FL	0.05	(0.00)	OH	0.08	(0.00)
GA	0.03	(0.00)	OK	0.05	(0.00)
HI	0.05	(0.01)	OR	0.08	(0.00)
IA	0.04	(0.00)	PA	0.05	(0.00)
ID	0.07	(0.00)	RI	0.03	(0.04)
IL	0.03	(0.00)	SC	0.03	(0.00)
IN	0.03	(0.00)	SD	0.08	(0.00)
KS	0.04	(0.00)	TN	0.04	(0.00)
KY	0.08	(0.00)	TX	0.05	(0.00)
LA	0.04	(0.00)	UT	0.08	(0.00)
MA	0.01	(0.22)	VA	0.04	(0.00)
MD	0.06	(0.00)	VT	0.04	(0.01)
ME	0.05	(0.00)	WA	0.07	(0.00)
MI	0.04	(0.00)	WI	0.09	(0.00)
MN	0.06	(0.00)	WV	0.05	(0.00)
MO	0.06	(0.00)	WY	0.08	(0.00)
MS	0.04	(0.00)	**sum**	**2.71**	**(0.01)**

Notes: p-values between parentheses.

Table 3. Fiscal rule, (1) and (6): US, 1962-2000.

	federal government		state governments	
	(1)	(6)	(1)	(6)
ρ	0.08	0.08	0.10	0.08
	(0.01)	(0.01)	(0.00)	(0.00)
α		0.08		-0.06
		(0.35)		(0.00)
obs	38	38	1887	1887
R^2	0.19	0.20	0.08	0.10
R^2 within			0.05	0.07
R^2 between			0.21	0.19
R^2 overall			0.08	0.10
Hausmann			1059.31	1144.58
			(0.00)	(0.00)
	1967	1992	-	-
AQ	(0.08)	(0.36)		
AP	(0.03)	(0.18)		
Bai	1966	1994		
	(0.00)	(0.00)		
	[-; -]	[-; -]		

Notes: heteroscedasticity and autocorrelation robust OLS estimates; AQ and AP indicate the corrected Andrews Quandt and Andrews Ploberger break date for the fiscal rule; the breaktest of Bai is Bai (1997), with the 33% confidence interval.

Table 4. System of fiscal rules, German Länder, 1970-2005.

	all Länder 1970-2005		old Länder 1970-2005		old Länder 1970-1990		old Länder 1991-2005		new Länder 1991-2005	
	ρ	p-value	ρ	p-value	ρ	p-value	ρ	p-value	ρ	p-value
federal	-0.01	(0.36)	-0.01	(0.38)	-0.06	(0.06)	0.00	(0.88)	0.00	(0.89)
BE	0.00	(0.00)	0.00	(0.00)	0.00	(0.01)	0.00	(0.04)	0.00	(0.04)
BW	0.00	(0.35)	0.00	(0.34)	0.00	(0.67)	0.00	(0.24)		
BY	0.00	(0.03)	0.00	(0.03)	0.00	(0.86)	0.00	(0.49)		
HB	0.00	(0.01)	0.00	(0.01)	0.00	(0.10)	0.00	(0.87)		
HE	0.00	(0.06)	0.00	(0.06)	0.00	(0.24)	0.00	(0.14)		
HH	0.00	(0.71)	0.00	(0.71)	0.00	(0.91)	0.00	(0.23)		
NI	0.00	(0.75)	0.00	(0.76)	0.00	(0.18)	0.00	(0.01)		
NW	0.00	(0.26)	0.00	(0.26)	0.00	(0.00)	0.00	(0.00)		
RP	0.00	(0.70)	0.00	(0.71)	0.00	(0.76)	0.00	(0.00)		
SH	0.00	(0.08)	0.00	(0.08)	0.00	(0.46)	0.00	(0.10)		
SL	0.00	(0.19)	0.00	(0.19)	0.00	(0.00)	0.00	(0.04)		
BB	0.00	(0.00)							0.00	(0.00)
MV	0.00	(0.20)							0.00	(0.12)
SN	0.00	(0.00)							0.00	(0.00)
ST	0.00	(0.00)							0.00	(0.00)
TH	0.00	(0.00)							0.00	(0.00)
sum	**0.01**	(0.21)	**0.00**	(0.29)	**0.00**	(0.38)	**0.00**	(0.20)	**0.01**	(0.03)

Notes: p-values between parentheses.

Table 5. Fiscal rule, German government

	federal government					
	1971-2005		1971-1990		1991-2005	
	(1)	(6)	(1)	(6)	(1)	(6)
ρ	-0.01 (0.75)	-0.01 (0.76)	-0.05 (0.46)	-0.04 (0.38)	0.03 (0.44)	0.05 (0.21)
α		0.59 (0.61)		0.30 (0.08)		0.31 (0.83)
obs	34	34	20	20	14	14
R^2	0.01	0.02	0.04	0.23	0.03	0.04
AQ	1975 (0.23)	1976 (0.29)	-	-	-	-
AP	(0.14)	(0.19)				
Bai	1984 (0.00) [1979;1984]	1979 (0.00) [1977;1981]				

Notes: heteroscedasticity and autocorrelation robust OLS estimates; AQ and AP indicate the corrected Andrews Quandt and Andrews Ploberger break date for the fiscal rule; the breaktest of Bai is Bai (1997), with the 33% confidence interval.

Table 6. Fiscal rule, panel fixed effects, German Länder

	all Länder		old Länder		new Länder			
	1970-2005		1970-1990		1991-2005		1991-2005	
	(1)	(6)	(1)	(6)	(1)	(6)	(1)	(6)
ρ	0.01 (0.58)	-0.03 (0.04)	-0.01 (0.24)	0.05 (0.68)	-0.05 (0.03)	-0.05 (0.02)	0.08 (0.03)	-0.02 (0.40)
α		-0.09 (0.00)		0.08 (0.00)		0.01 (0.57)		-0.16 (0.00)
obs	439	439	220	220	154	154	78	78
R^2 within	0.01	0.13	0.02	0.11	0.14	0.13	0.24	0.55
R^2 between	0.61	0.88	0.95	0.09	0.43	0.42	0.93	0.11
R^2 overall	0.11	0.30	0.35	0.03	0.34	0.34	0.01	0.35
Hausman	150.85 (0.00)	41.05 (0.00)	62.27 (0.00)	70.93 (0.00)	358.51 (0.00)	340.05 (0.00)	24.51 (0.00)	10.93 (0.00)

Notes: p-values between parentheses.

FIGURES

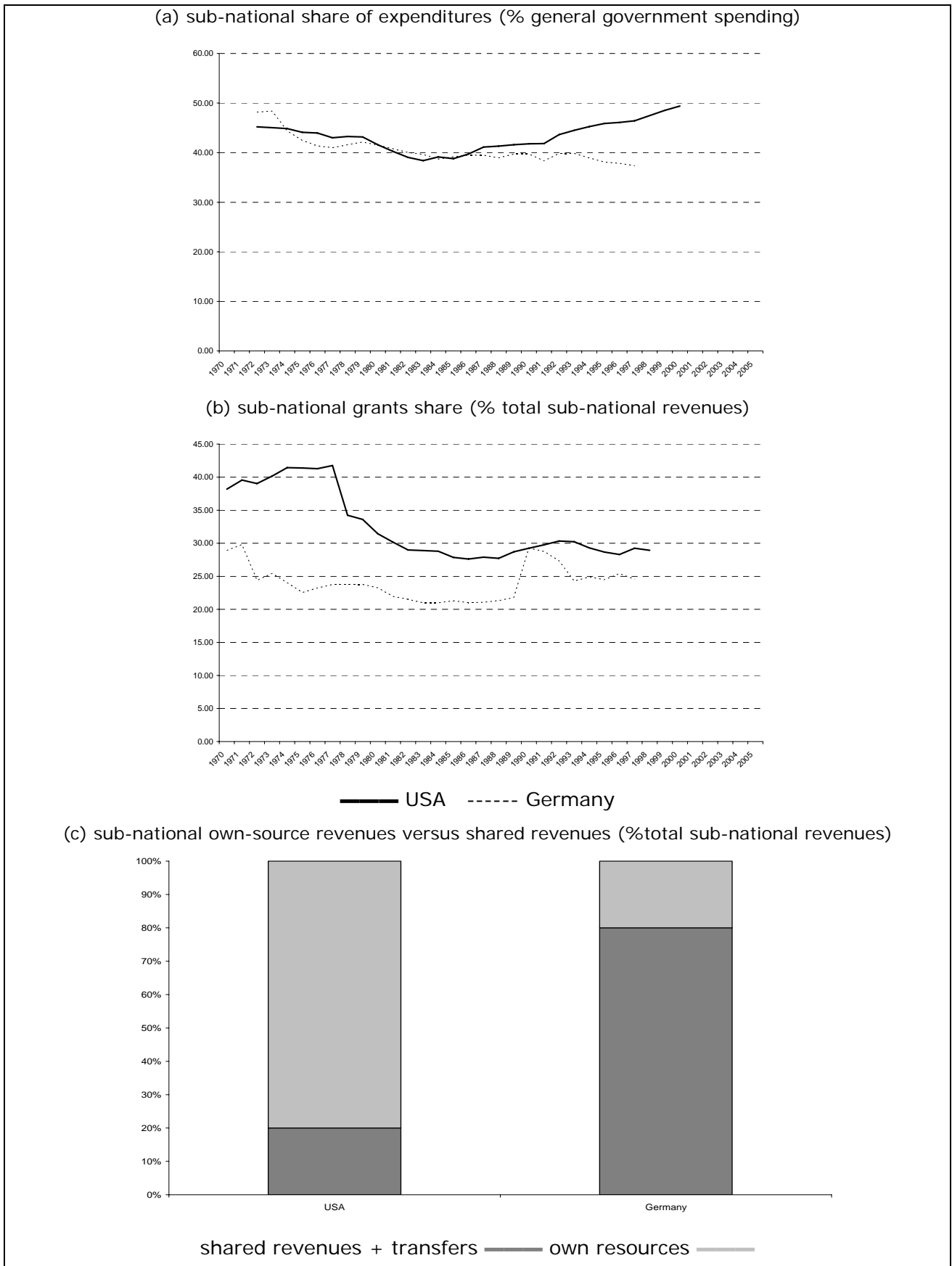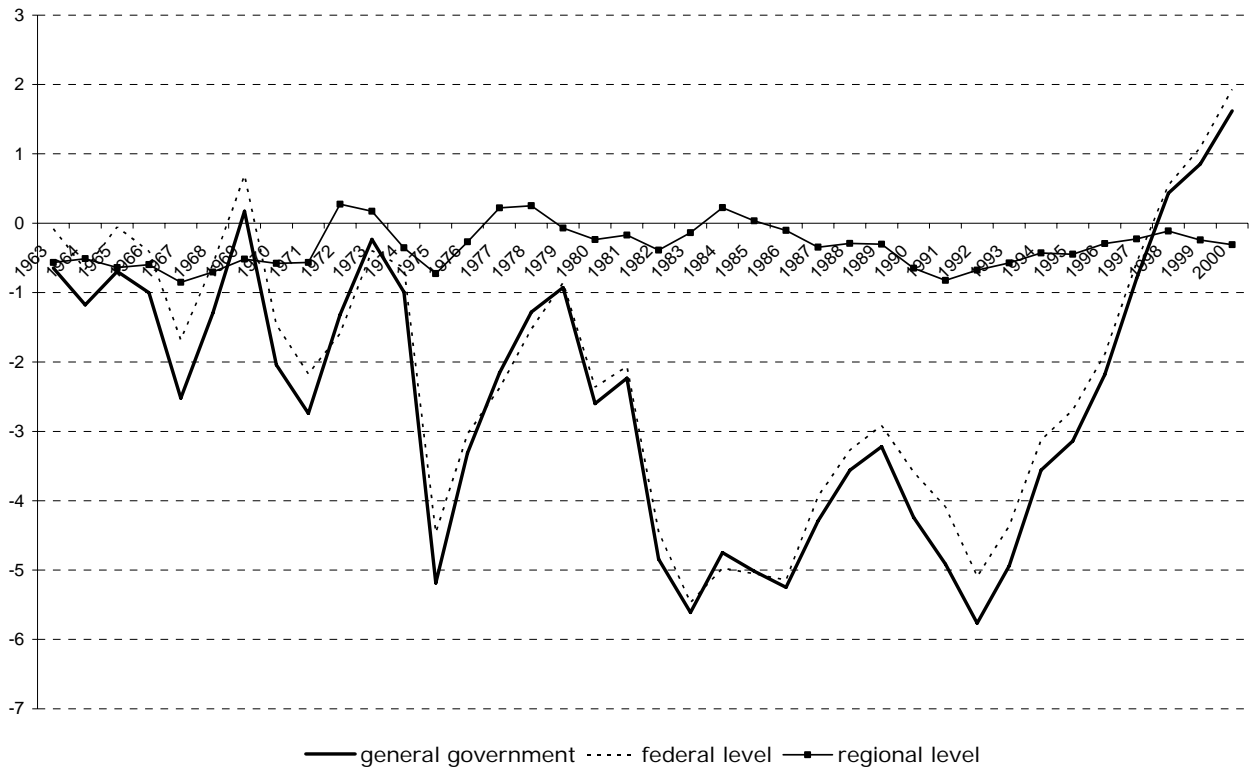**Figure 1. Vertical fiscal imbalance in US states and German Länder.**

(a) sub-national share of expenditures (% general government spending)

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

USA ------ Germany

(c) sub-national own-source revenues versus shared revenues (%total sub-national revenues)

shared revenues + transfers ▬ own resources ▬

Figure 2. United States, 1963-2000: fiscal series for government tiers.

(a) surplus to GDP ratio

——— general government   · · · · · federal level   —■— regional level

(b) debt to GDP ratio

——— general government   · · · · · federal level   —■— regional level
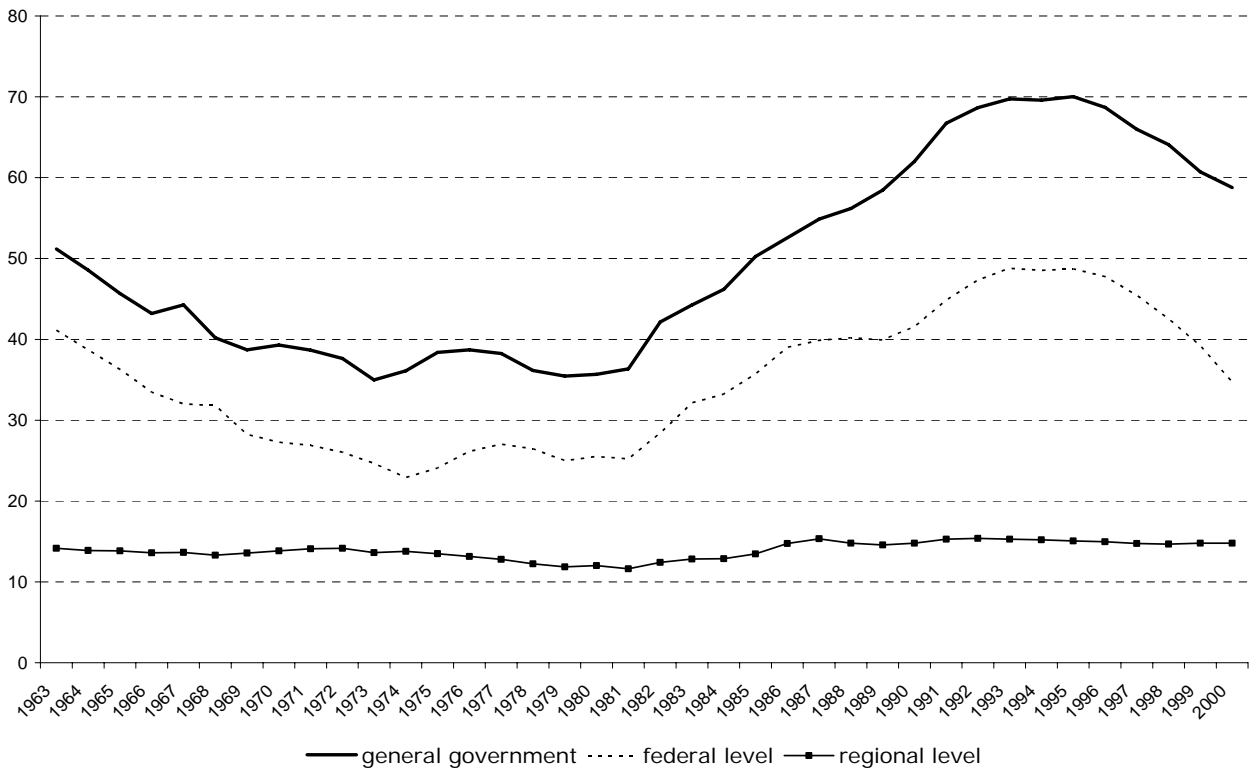
Figure 3. United States, 1963-200: histogram of fiscal data.

(a) surplus ratio (% of state GDP)
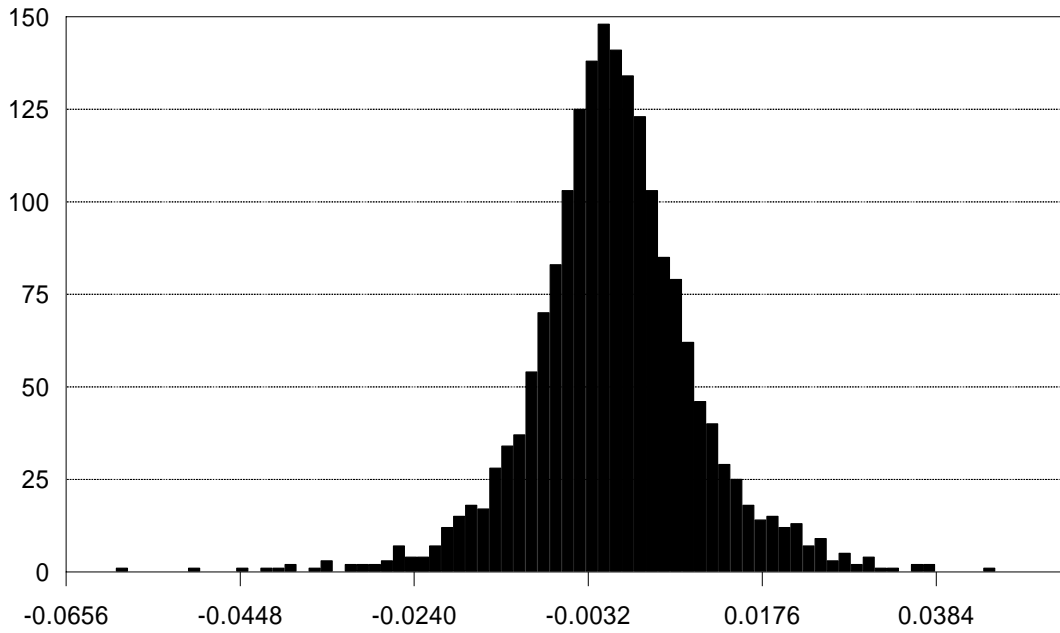
mean	0.05%	standard deviation	1.10%
maximum	4.99%	skewness	-0.14
minimum	-6.54%	kurtosis	5.60

(b) debt ratio (% of state GDP)
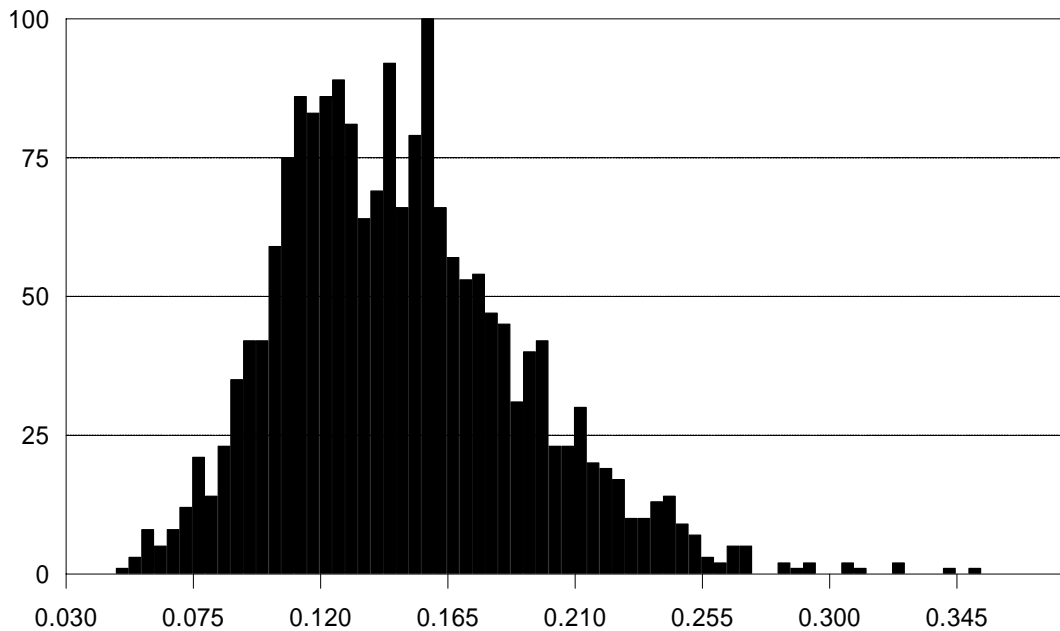
mean	14.22%	standard deviation	5%
maximum	36.80%	skewness	0.68
minimum	3.34%	kurtosis	3.75

Figure 4. Germany, 1970-2005: fiscal series for government tiers.

(a) surplus to GDP ratio

—— general government   ····· federal level   —■— regional level

(b) debt to GDP ratio
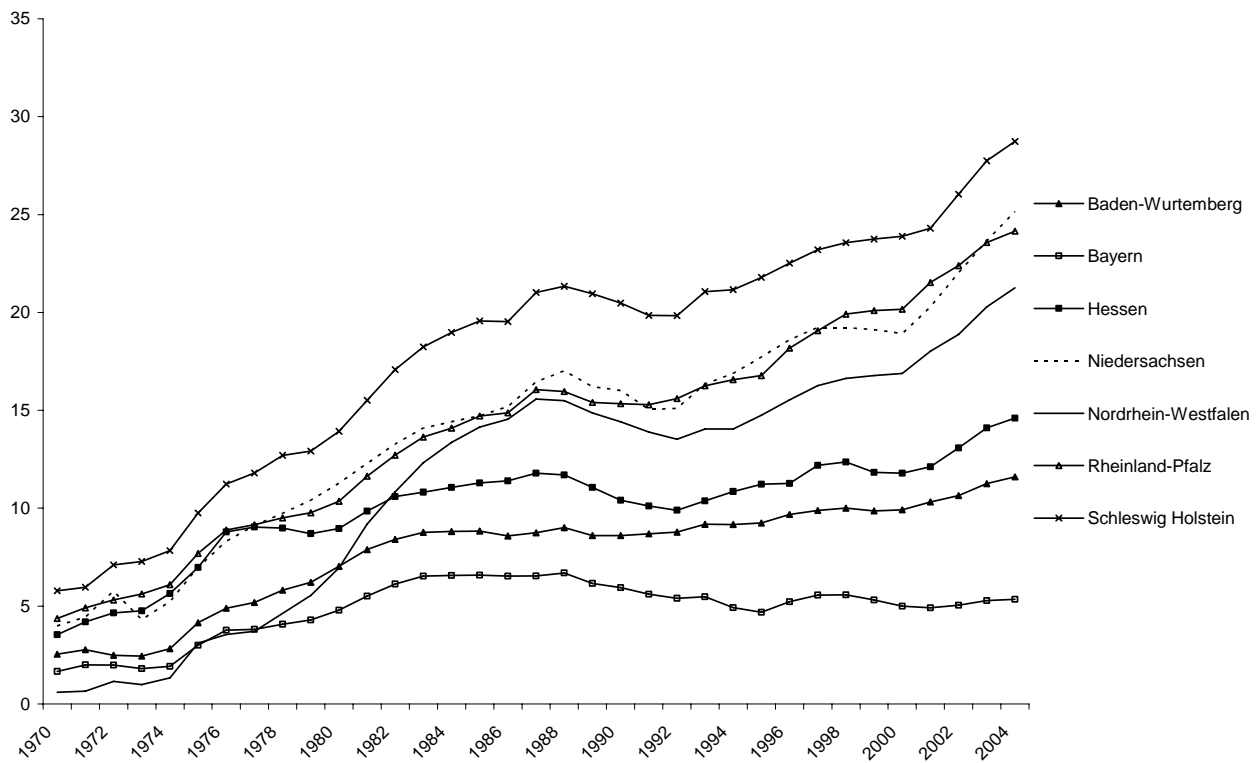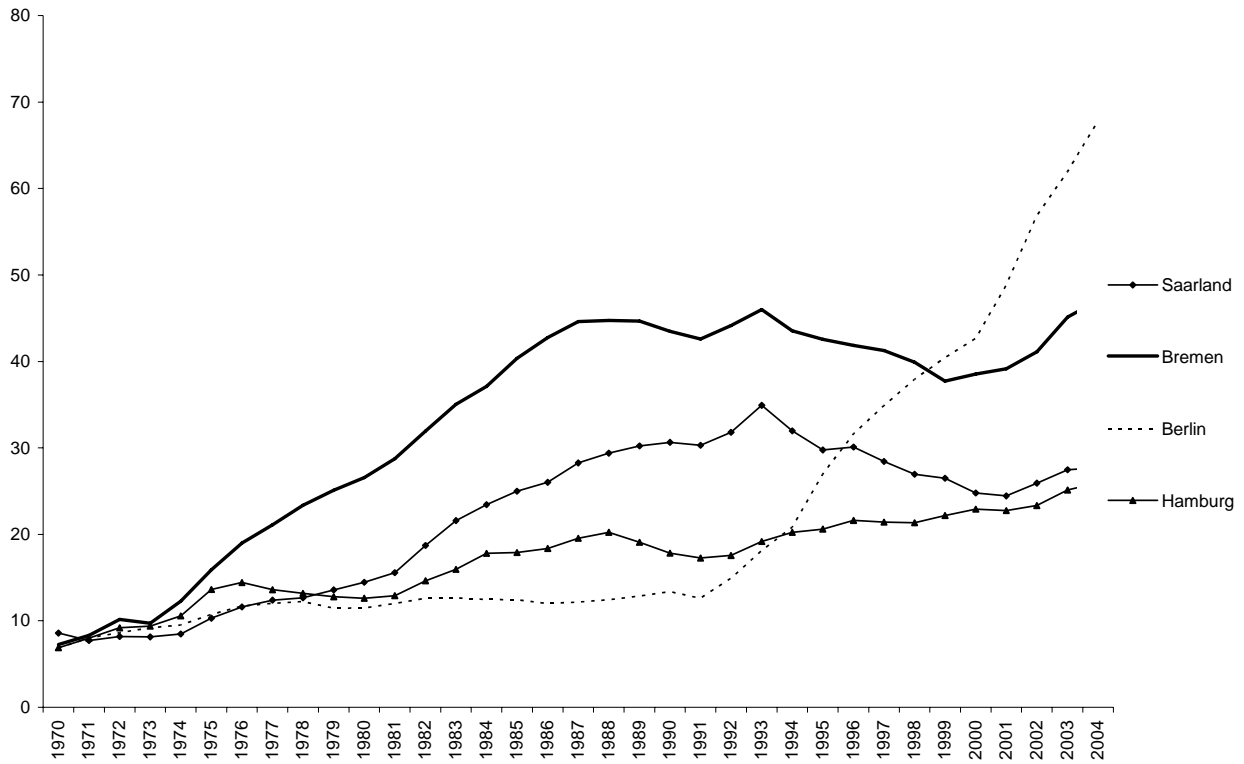

—— general government   ····· federal level   —■— regional level
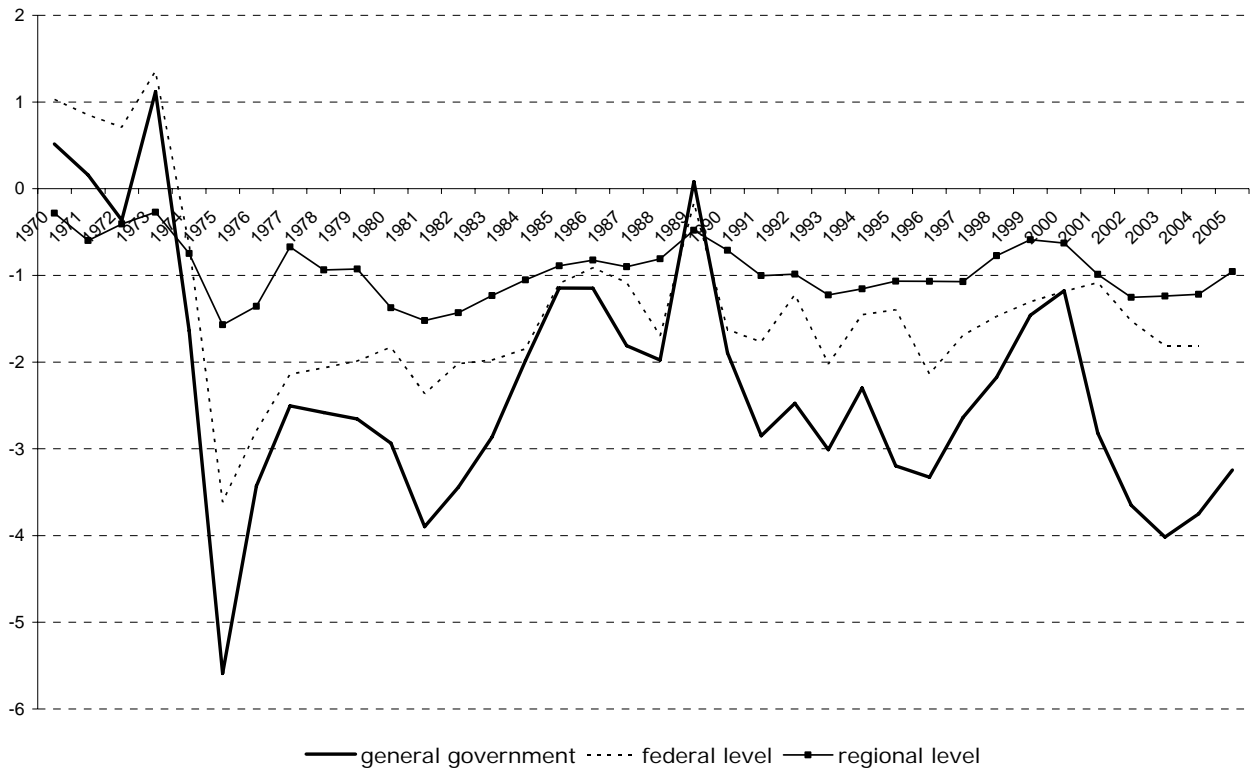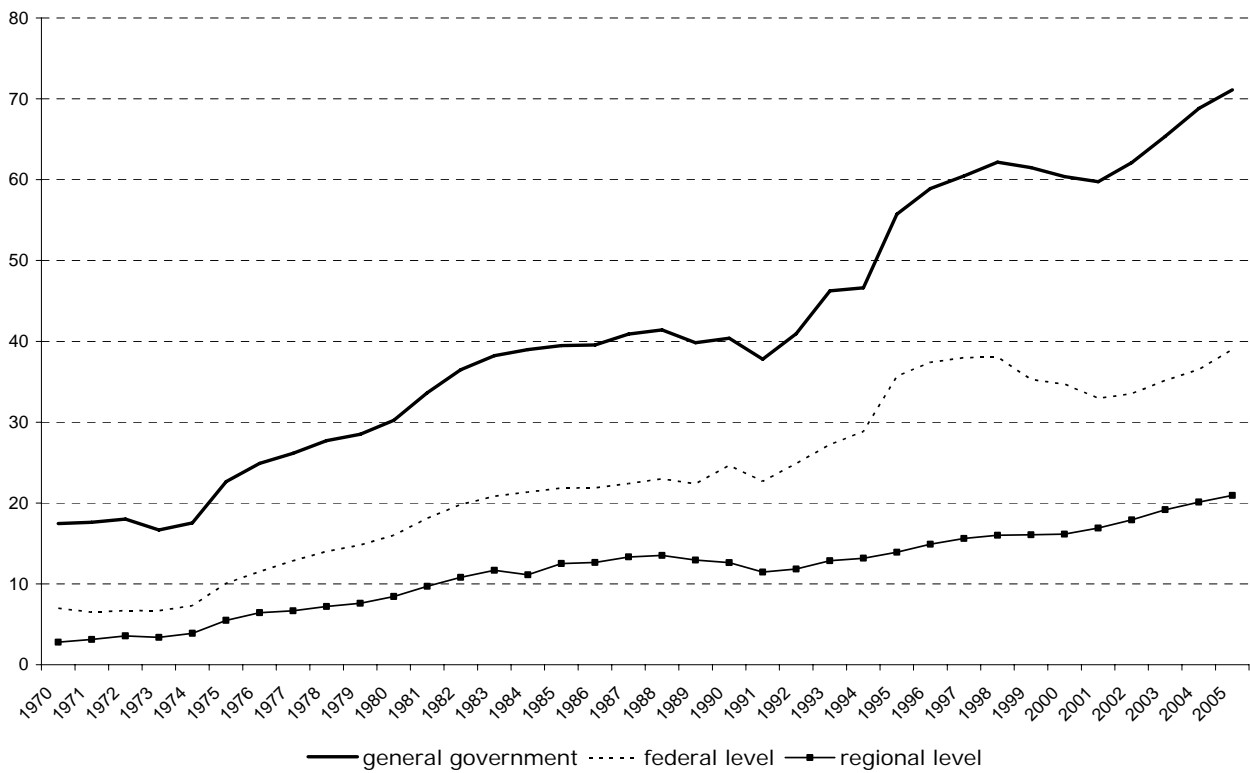
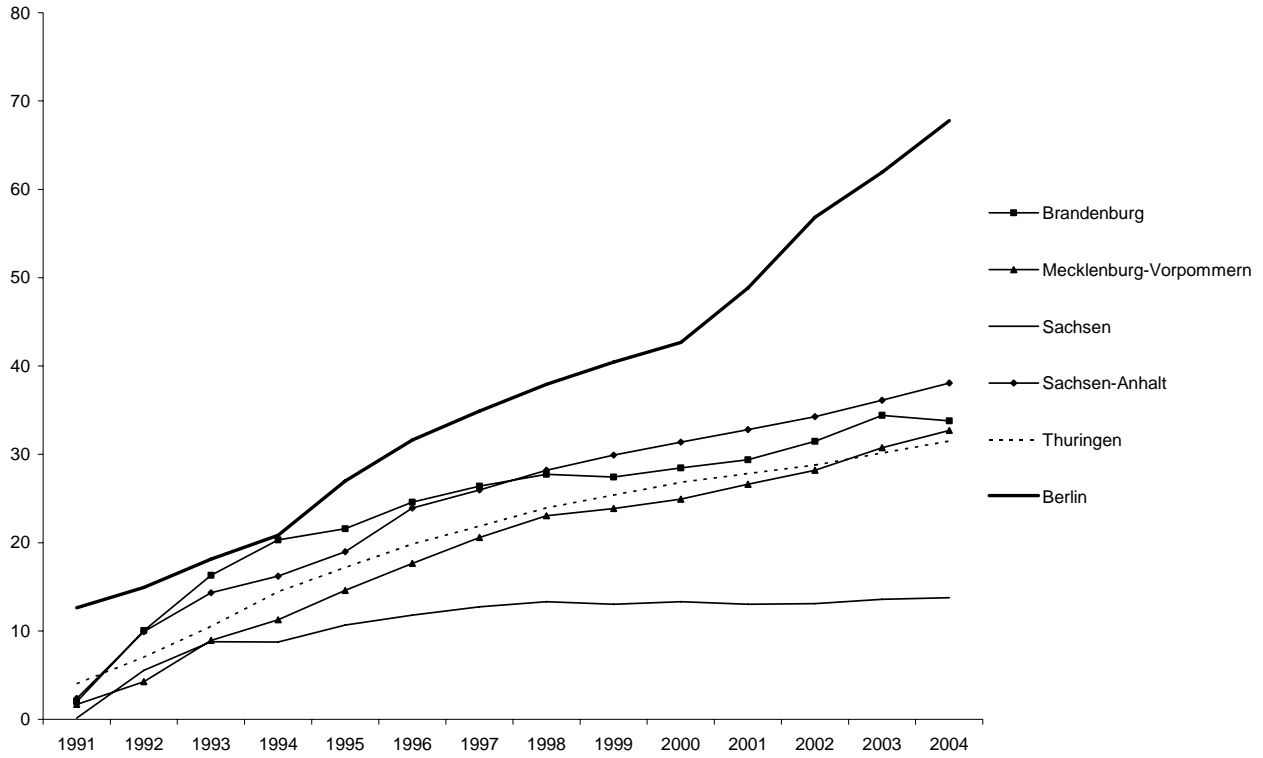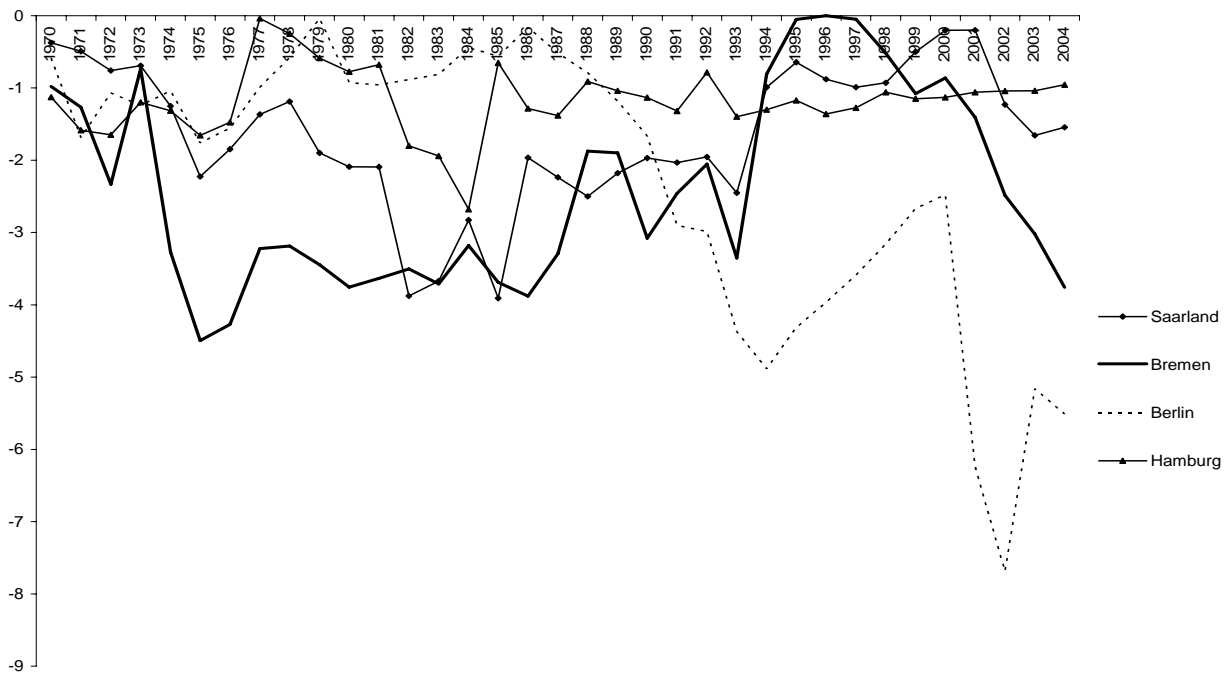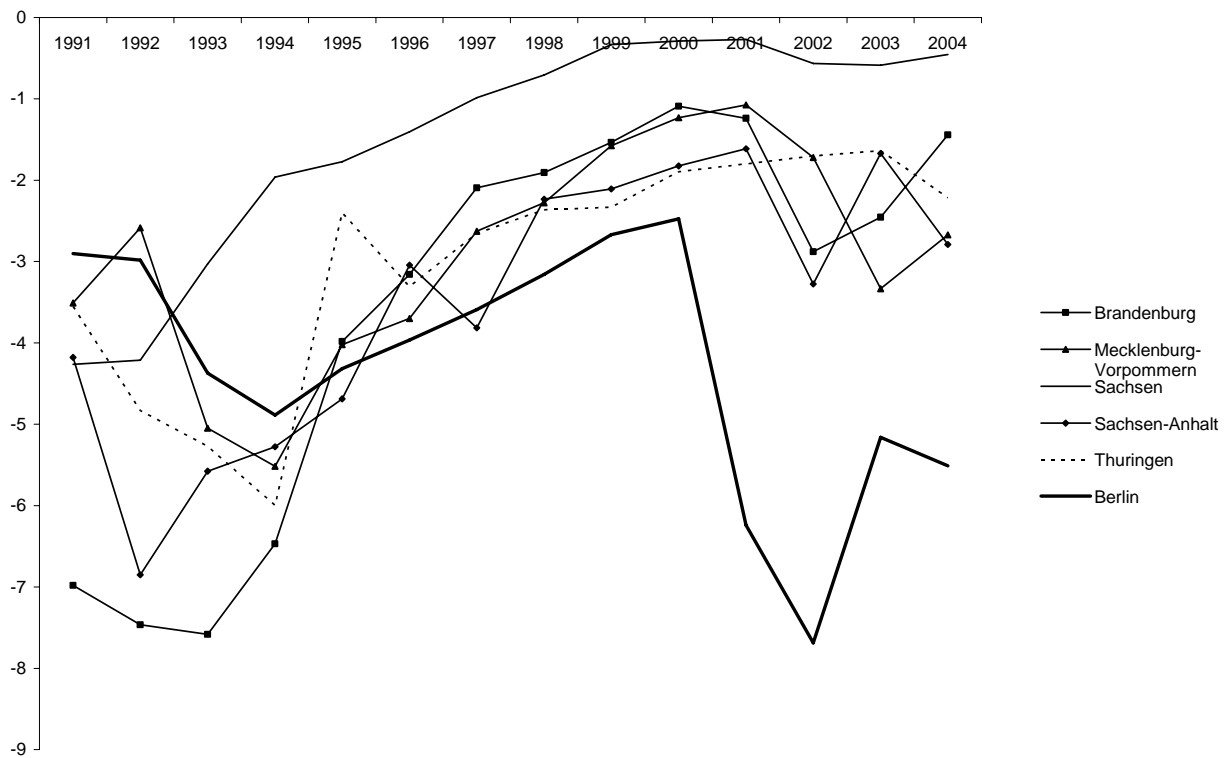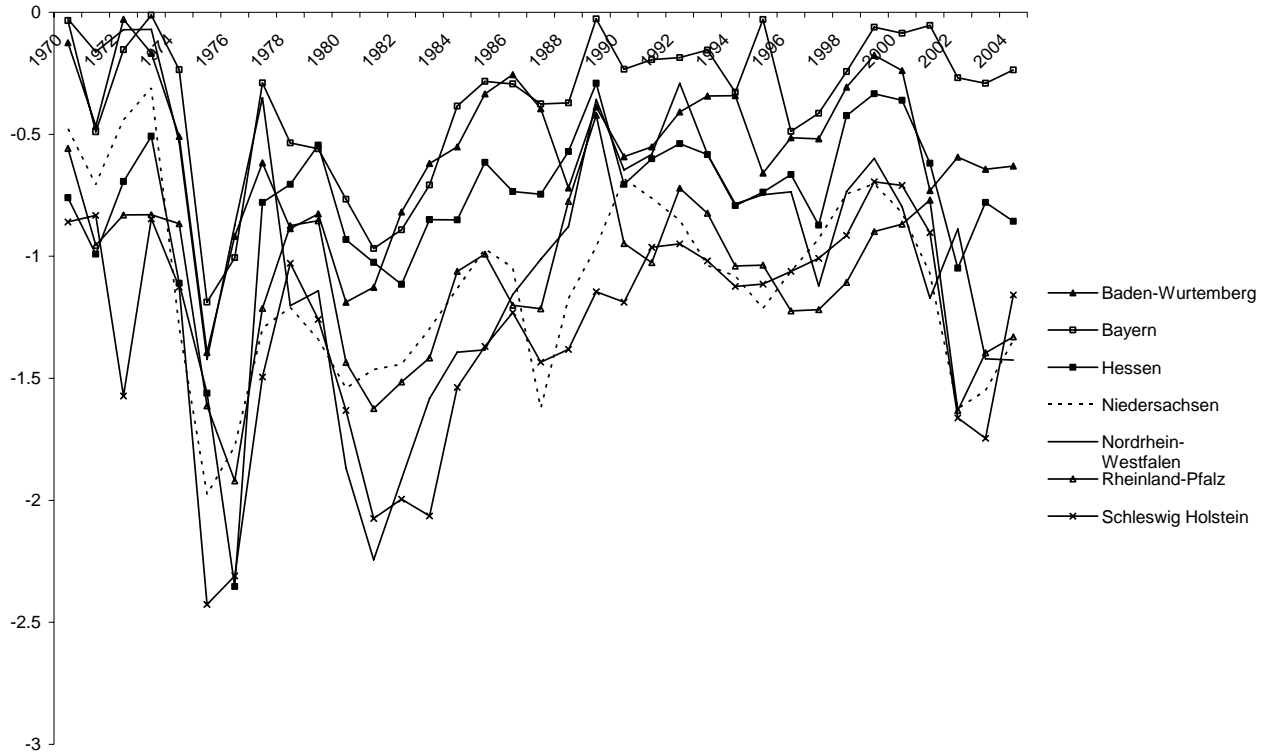**Figure 5a. State debt ratio for German Länder (% of state GDP).**

Figure 5b. German Länder: state surplus ratio (% of state GDP).

Baden-Wurtemberg
Bayern
Hessen
Niedersachsen
Nordrhein-
Westfalen
Rheinland-Pfalz
Schleswig Holstein

Brandenburg
Mecklenburg-
Vorpommern
Sachsen
Sachsen-Anhalt
Thuringen
Berlin

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. The dataset contains series on total expenditure, total revenues, total interest on debt and outstanding debt.

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 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.

Table A.1. Codes for US states.

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

GERMANY

Data on the fiscal policies and GDP of the German Länder come from the joint regional database of the federal government and the statistical institutes of the Länder (www.vgrdl.de), yearly issues of the Statistical Bulletin of the Statistisches Bundesamt, and several publications of the Ministry of Finance. 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 for both new and old Länder. Fiscal data for the former West-German Länder are available as from 1970.

The 16 Länder can be divided in large states ('Flächenländer') and city-states ('Stadtstaaten').

All data 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.

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