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**FISCAL SUSTAINABILITY ACROSS
GOVERNMENT TIERS**

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Universitat de Barcelona**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 debt consolidation, 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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1. Introduction

Increasing economic integration is shifting political sovereignty to both supra-national organisations and regional governments, not only in Europe but world-wide. The ongoing process of shifting political powers urges some insight in the consequences of fiscal decentralisation on public budgets (Ter-Minassian, 1997; Wildasin, 1997). 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 among different government levels. In addition to (vertical) transfers from the central government, (horizontal) transfers between regional governments complement regional budgets. Incomplete fiscal autonomy reduces incentives for lower tier governments to pursue fiscal discipline. Devolving fiscal power is therefore likely to create fiscal imbalances. Regional governments can run up debt, and try to shift the burden on the central government (or other regional governments). Federal fiscal systems are therefore complemented with control systems on the sustainability of public finances at lower tiers. These fiscal rules are not always effective constraints. Tax sharing agreements and joint spending schemes often provide implicit additional financing of regional budgets. In extreme cases, this may even entail explicit bail out.

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 (Inman, 2003). These models are often much stylised, and do not grasp all institutional and economic aspects of fiscal federalism. Empirical studies that look into the sustainability of different federal fiscal systems are fraught with two major identification problems. First, intergovernmental transfers do not only allocate, but also redistribute tax resources between rich and poor regions. No fiscal system is neutral in this regard. Second, expectations of bail outs are what matter for the sustainability of any federal fiscal system (Bordignon, 2006). These expectations are hard to identify in the budget data we observe. On the one hand, bail outs are not necessarily the consequence of prolonged unsustainable fiscal policies. On the other hand, 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. Consequently, we need not observe sustainability problems in the data. Focussing on bail outs overlooks these strategic interactions between different tiers of government.

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 for assessing fiscal sustainability. Most studies have considered general government data (Galí and

Perotti, 2003; Ballabriga and Martinez-Mongay, 2005). Given that any additional transfers for implicitly bailing out regional governments are financed by at least one other tier of government, the aggregate deficit and debt position provides an indicator of overall sustainability of the federal fiscal system. Contrasting overall sustainability with a disaggregate analysis for the different tiers of government then indicates problems of fiscal imbalance implicit in the federal fiscal system.

We thus test a fiscal rule both for the federal government and for regional tiers. We compare 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 fiscal imbalance. But while in the US, the majority of transfers are provided by vertical transfers from the central budget, Länder are predominantly financed by (horizontal) intergovernmental transfers that are complemented with specific transfers from the central level.¹ We argue that this different set up of the fiscal system is responsible for different responses to public debt. The federal government cannot induce lower tiers to react in a stabilising way to debt when large part of the revenues are shared across lower tiers of government. Regions that are financed by horizontal transfers do not internalise the spillover on aggregate debt. Results indeed indicate that 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 paper is structured as follows. In section 2, we develop the test for the sustainability of public finances across different tiers of government. In section 3, we present the fiscal rule as a means for testing sustainability. In section 4, we discuss the empirical results and argue 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.

¹ In addition, tax autonomy of German Länder is much more constrained than in US states.

2. Sustainability of fiscal policy across government tiers

The continued high deficits in most industrialised countries in the seventies and eighties caused concern about the sustainability of public debt. This raised interest in ways to constrain the ‘deficit bias’ that seems inherent to the political decision process. Fiscal rules have taken the form of an improved design of the budget process or a numerical target on deficit or debt ratios. Part of the debt problem may be due to shifting political power. In the last two decades, increasing economic integration has been associated with political disintegration of existing countries, and the creation of more supra-national structures (Alesina *et al.*, 2000).

Devolution of fiscal policies further complicates the problem of controlling government finances. The main reason is the incompatibility of the constitutionally determined division of spending tasks, and the sharing of (tax) revenues across different government levels. 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. Less than complete fiscal autonomy accordingly gives incentives to lower tier governments to spend on local public goods with revenues that draw from the common pool of resources of the entire federation. Regional budgets are usually complemented with (vertical) transfers from the central government or (horizontal) transfers from other regions. Regional governments may thus indulge in unsustainable policies and have little reason to adjust the budget to satisfy their intertemporal balance. The federal fiscal system faces a problem of soft budget constraints.

Federal fiscal systems are therefore complemented with control systems on 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 some federations, the central and regional government cooperate in councils (e.g. Austria, Belgium, and Germany). In others, there are explicit numerical limits on the regional borrowing capacity (e.g. EU).² A combination of institutional, political and economic factors accounts for 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 (Inman, 2003).

² In some 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).

The empirical analysis of sustainability of different federal fiscal systems is rather scant.³ Apart from data problems, the main reason is that disentangling the effect of different fiscal systems on aggregate fiscal sustainability is fraught with two major difficulties (Bordignon, 2006). First, most fiscal federal systems are not primarily designed for allocating resources to different tiers of government. Above all, devolution of political power reflects cultural and economic heterogeneity. Hence, fiscal federal systems mainly aim at redistributing resources between rich and poor regions. Redistributive and purely allocative transfers are intertwined and hard to disentangle. Second, the identification of a sustainability problem at regional level is hampered by the strategic behaviour of both central and sub-national tiers of government. The basic problem is that we may not observe debt problems in the data at regional level, even if there are soft budget constraints. The absence of bail out does not imply that the fiscal system is sustainable.⁴ The central government can set up the fiscal system to avoid the direct recourse to the central budget of regions in fiscal trouble. Basically, the federal and regional governments may anticipate fiscal problems with additional transfers. At the same time, regional governments may anticipate future adjustments in grants of other governments. Expectations of bail outs are what matter for sustainability (Bordignon, 2006). These expectations are hard to identify in the fiscal data we observe.⁵

Most studies of federal fiscal systems focus on cases of regional default and bail out (Rodden *et al.*, 2003; Singh and Plekhanov, 2005). However, the identification problem occurs because the focus is on regional public finances. The consequences for the sustainability of public finances are hard to detect as we need to uncover the complete incentive structure in the intergovernmental relationships. However, we can avoid making assumptions on how the fiscal system affects the expectations of bail out by comparing the evolution of general government deficits and debt to that of the central and regional government. 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) so as to account 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. A

³ Darby *et al.* (2005) stress the importance of fiscal adjustment across all government levels for achieving an economically successful consolidation. Büttner and Wildasin (2006) are closer to our model, as they examine how US municipalities adjust spending or taxes to achieve sustainable policies in a panel VEC model.

⁴ However, a bail out is not necessarily an indication of unsustainable fiscal policies.

⁵ 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. Dahlberg and Petterson (2003) test expectations of bailouts for Swedish municipalities.

robust test for sustainability can be based on the response of the fiscal surplus s_t to initial public debt b_t^* , as in (1):⁶

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

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.⁷

Extending the test to different tiers of government, we can infer on a problem of sustainability in the federal fiscal system. By testing the response of surpluses to debt, we avoid making strong assumptions on the expectations of bail out, and may disregard all sorts of strategic interactions between different tiers of government. The fiscal system is thus only a latent variable in our tests.

In particular, in a reaction function like (1), a strictly positive response of the general government surplus to the debt stock is a sufficient condition for aggregate sustainability of the fiscal system. Nonetheless, if at least one tier of government takes on the burden of debt of another government level, overall sustainability can still be consistent with a soft budget problem. Direct bail out or transfers by one government tier may compensate for the debt build-up of another government. Hence, we need to disaggregate sustainability by inferring on the debt response for different government levels. Let us assume there is a single federal government, and $N-1$ regions in the country. We henceforth denote variables for the federal government level with subscript '1' and the regions by 2, ..., N . There are then several ways to infer on sustainability for different government levels, depending on the restrictions we impose on the interaction between several government levels.

What matters for aggregate sustainability is that all governments react to some extent to aggregate

⁶ 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 the intertemporal budget constraint (Bohn, 2007).

⁷ 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.

public debt. The condition (1) can then be decomposed into a restriction $\rho > 0$ for the different tiers of government,

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

As long as the aggregate reaction of the federal government and the different regional governments is strong enough to offset rises in debt with higher surpluses, public debt is sustainable. It matters little which government is stabilising debt in this case. We may test condition (2) with a system of fiscal rules like (3),

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

Now suppose the federal government is the only government to stabilise debt, while all regions disregard debt. In this extreme case, the federal government bears completely the brunt of debt. This would be a serious problem of soft budget constraints. We can test whether the federal government consolidates more than the regions consolidate jointly in (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.⁸

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

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

⁸ In contrast, if the federal government were to pursue unsustainable fiscal plans, general government debt might still be sustainable if regions bail out the central government. These ‘top-down’ soft budget constraints are a rather odd assumption though. A weak center and strong regions exist in a few (con)federations. But in cases like Argentina or Brazil, regions have usually shifted their fiscal problems to the federal level, pressuring the central government to use its privileged access to central bank financing in the common currency.

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

$$\rho_i > 0 \quad i = 1, \dots, N \quad (5)$$

implies that every tier of government runs a sustainable fiscal policy. Fiscal policy will be sustainable if (2) holds: if each government controls its public debt, fiscal policy will be sustainable on aggregate. 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 each tier individually. Actually, a weaker condition 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. In the latter case, there may still be offsetting transfers between regions that makes regional budget constraints soft. But there is a hard constraint on fiscal relations between the first and second tier of government. We test this condition with a fiscal rule (1) for the federal government, and the condition that regions run sustainable policies in a panel version of the same 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 the burden of fiscal adjustments is spread across various tiers of government to maintain fiscal sustainability at the aggregate level.

The setting of fiscal policy is determined by many other factors of course. A simple regression of the surplus on debt might suffer from an omitted variable bias (Bohn, 1998). Ideally, the specification of a fiscal rule would derive from some theory of public spending and taxation. The Barro tax smoothing model is one such model; but there are several alternative theories available for fiscal policy. According to the Fiscal Theory of the Price Level, the surplus should react to debt only. More elaborate DSGE models of fiscal policy argue that the government should target the output gap and inflation (Benigno and Woodford, 2003). Still other theories argue that the interaction with monetary policy is important, and hence the policy stance of the central bank should be accounted for (Dixit and Lambertini, 2003). There are other ‘political’ models of fiscal policy as well, which argue that the fiscal stance is determined by political factors, such as majority-minority government, political colour, etc. Political business cycle theories argue that the government tries to influence economic conditions (Drazen, 1999). Several of these theories point to the importance of cyclical conditions in the determination of the surplus. Hence, the inclusion of the GDP growth rate in the fiscal rule could

alleviate the omitted variables problem. Fiscal rules have indeed been used 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. In economic booms, tax revenues rise as tax bases grow. In contrast, spending on transfers and unemployment benefits will fall. Wibbels and Rodden (2006) examine the cyclicity of central versus regional fiscal policies in the US and Germany. There are some alternative ‘political’ explanations for growing regional public debt, such as the political affinity of regional governments and the federal government, the political party in power, coalition formation or the size of the region, among others. Berger and Holler (2007) find that common economic factors and state-specific economic conditions are more important determinants of state fiscal performance than these political factors in Germany. There are also few robust findings for the effect of political factors in US states (Wibbels and Rodden, 2006). Hence, as political factors do not seem of prime importance, we rewrite the fiscal rule (1) accounting for cyclical developments only:

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

We specify all fiscal variables in ratios to GDP in (6). 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.

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) and (6) for the general government with OLS. We then disaggregate this consolidated budget response into the contribution of either the central government or regional fiscal policies. We provide a fiscal rule estimate for the central government and for each regional government separately. If each government tier controls its public debt, no problems of soft budget constraints arise. Alternatively, we may compare the average debt response of all regional governments to the one of the central government. We apply panel OLS estimates of the fiscal rule for all regions jointly. There are 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. Also, changes in federally mandated expenditures influence state budgets. Moreover, the mobility of tax bases imposes some implicit constraints on revenues. Apart from these common economic factors, there could be other idiosyncratic characteristics of each region that are controlled for by the introduction of region fixed effects.

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 our 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 nonetheless not avoided bankruptcy at the county or city level.⁹ 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 bail outs 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 the equalisation of living conditions.¹⁰

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 crowding out federal policies 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. This ratio of received transfers on total regional government spending reflects the gap between the sub-national government’s own revenue and its expenditure responsibilities.¹¹ Grants finance a similar share of spending in the state budgets in the US and Germany (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

⁹ Some well known examples are New York City in the 1970s, Orange County in the 1980s and Washington DC and Philadelphia in the 1990s.

¹⁰ 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.

¹¹ Various studies have found that the probability of a bail out depends on this indicator (Singh and Plekhanov, 2005).

(‘*Länderfinanzausgleich*’) is explicitly written into the German Constitution.¹² These are further complemented with vertical transfers from the federal level to further reduce economic disparities and finance specific tasks.¹³ 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 only 20%. In contrast, German Länder have full competence over about 20% of tax revenues only (figure 1c).

3.2. 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.

Data on German fiscal policies come from different sources. General government series are from the OECD. Data for the central government are available from the Public Finances Series of the *Statistisches Bundesamt* (Fachserie 14, Reihe 3.1). Regional budget data were provided by the Ministry of Finance, which are also the data provided to the OECD for their studies on fiscal federalism (Wurzel, 1999). The surplus measures the net absorption of credit on financial markets, by both the Länder and the towns in every Land. Land GDP comes from the revised data from the *Volkswirtschaftliche Gesamtrechnungen der Länder*. Fiscal data are consolidated across Länder and towns. Data cover the sample 1970-2005. There are some notorious breaks in German fiscal policy.¹⁴ First of all, the Reunification of Germany urges us to consider some different sample periods. We control for the shift in data with an impulse dummy and a time trend as of 1991 when we consider the full sample. In addition, we consider two different sample periods: 1970-1990 for the old Länder; 1991-2005 for both new and old Länder. Nonetheless, the former Eastern German Länder started to

¹² 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.

¹³ 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.

¹⁴ We cleaned the German data for the sale of the UMTS licenses, which had an unusually large budget impact in 2000.

participate in the *Finanzausgleich* system since 1994 only. The federal government took over the debt of the former GDR states, and this increased public debt by about 9% in GDP. However, as this mainly reflected an accounting issue, the national accounts and the Maastricht definition of deficit/debt allowed including this amount in public debt directly, without having an effect on the deficit of that year. That is the reason why there is a jump in the 1995 data for general government debt, but not for the deficit. The absorption of debt of some Länder by the central government has direct implications for their fiscal relations. Nonetheless, we preferred using the data provided by OECD instead of calculating back the deficit ratio ourselves. This has also been common practice in several other papers on German fiscal policy (Berger and Holler, 2007; Ballabriga and Martinez-Mongay, 2005; Rodden, 2005; Galí and Perotti, 2003). 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 cent) is still low in comparison.¹⁵ Apparently, state fiscal policies are rather well behaved.

German regional policies are as important as the federal budget in determining the overall budget balance (figure 4a). 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. These reflect the strong spending boost of the Brandt government around 1976, German Reunification (1991) and the consolidation since entry in EMU (1999). 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).

¹⁵ 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.

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 in 1992 shows the enormous fiscal havoc in both states that led to the federal bail out in 1993. The continuous financial support to both regions has only in part led to a reduction in deficits, and deficits have continued to grow in recent years. 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 as the new states faced very large spending responsibilities at a moment that economic transition caused revenues to fall.¹⁶ 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 state 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 deficits under control, but this has become more difficult in recent years. Deficits have started to grow again in all Länder. As a consequence, the steady position of debt in a range of about 10 to 25 per cent across Western German Länder has not been kept (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.¹⁷

4. Results

Table 1 replicates the estimates of fiscal rules for general government of other studies. The estimates of the baseline fiscal rule on general government data confirm some of the earlier evidence in the literature.

US fiscal policy is sustainable over the period 1963-2000. 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. The result seems nonetheless rather robust: the reaction coefficient does not change once we allow for a

¹⁶ The only exception here is Sachsen.

¹⁷ Berlin applied for federal government intervention in October 2006, but its request was repealed by the Federal Constitutional Court.

cyclical response of the budget in the fiscal rule (6).¹⁸ 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 increasing defence spending on 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 these breaks are located at the ends of the sample, we cannot explicitly model the differences in debt response.

For Germany, the response of the government budget 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 also confirm the relevance of this shift. However, if we condition the break test on the Reunification in 1991 (and in additional control for changes in volatility in the subsamples), then there is evidence of a change in debt response 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. Estimating the fiscal rule over these subsamples shows a significant difference in debt consolidation. The debt response is insignificant for West-Germany, whereas there is some weak evidence that German fiscal policy became more sustainable afterwards after Reunification.¹⁹ 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 also that the finding of weakly procyclical policies has been a common finding for German fiscal policy.

The aggregate debt responses can be attributed to rather different reactions of the central government and the state governments in the US and Germany. We first test the sustainability of federal government policies and each US state in a system of fiscal rules.

¹⁸ The results seem to be robust to the inclusion or not of the cyclical variable. We have also used IV estimation techniques to take into account the potential endogeneity, and results are quite similar to the ones shown in the paper. Results are available from the authors upon request.

¹⁹ In contrast, Galí and Perotti (2003) or Greiner and Kauermann (2007) find weaker responses to debt over the nineties.

Table 2 shows that the US federal government responds only weakly to aggregate public debt. Since 1994, fiscal policy has adjusted and is focused on consolidation, however. 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 apparently no soft budget constraints. States do not shift the burden of consolidation to the federal government, or to other states.

Actually, government tiers in the US fiscal system face even harder budget constraints. 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.²⁰ At the same time, the 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. In other words, debt is sustainable in the US because federal fiscal policy responds to federal debt, and given the transfers received from other government tiers, states are able to consolidate their own debt too.²¹

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 the federal government assumes fiscal problems of the Länder, and solves their debt situation. 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. Only two Länder would contribute to aggregate debt stabilisation before 1991. After Reunification, the majority of old Länder does so. In contrast, only two out of six Länder run unsustainable policies.

As the aggregate debt burden may hide 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

²⁰ In contrast to Wibbels and Rodden (2006), we find that the cyclicity of regional budgets is rather low. Cyclical variations are non-existent (or even procyclical) in the German Länder budgets.

²¹ The estimation of a fiscal rule for every state individually confirms positive debt responses (results not reported).

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 instead 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.²² Surprisingly, Länder budgets have been procyclical since 1991, but were able to stem cyclical fluctuations before Reunification. In contrast, the new Länder have set surpluses to counter debt rises in their region. To sum up, debt problems seem to be inherent to the German fiscal system. After Reunification, these problems have on the one hand been alleviated by the federal government, by absorbing some of the financing problems of the new Länder and keeping federal debt under check. On the other hand, this exacerbated fiscal tensions for the old Länder. It is less clear that these keep regional debt under control.

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 tax payers. Nonetheless, the debt problem seems to be intrinsic to the set up of the German fiscal system. And 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 adjusting the spending or revenue sides of the budget becomes rather complicated. 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

²² Many Länder disregard sustainability of their debt at the regional level. The results for individual fiscal rules are not reported.

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

5. Conclusions

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. 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 debt consolidation 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: the application of fiscal rules is lax. Länder do not internalise the spillover on aggregate debt.

This paper is a first step in the empirical analysis of fiscal relations between different government tiers. We have abstracted from many relevant issues. First, the specification of the fiscal rule is simple. 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. 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 interaction between different government levels. More detailed data are necessary for this. 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 for local government (Brückner, 2003). Similar evidence at the federal and regional level is much 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.

| | US | | Germany | | | | | |
|----------------|----------------|----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| | 1962-2000 | | 1971-2005 | | 1971-1990 | | 1991-2005 | |
| | (1) | (6) | (1) | (6) | (1) | (6) | (1) | (6) |
| ρ | 0.06 (0.02) | 0.05 (0.03) | 0.01 (0.69) | 0.14 (0.06) | 0.01 (0.95) | 0.21 (0.29) | 0.14 (0.14) | 0.15 (0.15) |
| α | - | 0.14 (0.12) | - | -0.81 (0.06) | - | -0.12 (0.27) | - | -0.26 (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 |
| AQ | 1967 (0.08) | 1991 (0.27) | 1982 (0.30) | 1976 (0.25) | - | - | - | - |
| AP | (0.03) | (0.21) | (0.29) | (0.17) | | | | |
| Bai | 1966 (0.00) | 1994 (0.00) | 1983 (0.00) | 1981 (0.00) | | | | |
| | [-;-] | [-;-] | [1976;2000] | [1979;1983] | | | | |

Notes: coefficients are heteroscedasticity and autocorrelation robust OLS estimates; AQ and AP indicate the p-values for the corrected Andrews Quandt and Andrews Ploberger break date for the fiscal rule; Bai is the breaktest of Bai (1997), with its p-value and 33% confidence interval; for the specification for Germany, a shift dummy and time trend is included since 1991 for the full sample estimates.

Table 2. Fiscal rules for government tiers, system estimates (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 | | panel of state governments | |
|------------------------|--------------------|----------------|----------------------------|-------------------|
| | (1) | (6) | (1) | (6) |
| ρ | 0.08 (0.01) | 0.08 (0.01) | 0.10 (0.00) | 0.08 (0.00) |
| α | | 0.08 (0.35) | | -0.06 (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 (0.00) | 1144.58 (0.00) |
| AQ | 1967 (0.08) | 1992 (0.36) | - | - |
| AP | (0.03) | (0.18) | | |
| Bai | 1966 (0.00) | 1994 (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. Fiscal rules for government tiers, system estimates (3), 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, Länder names in bold are former West-German states; for the specification for Germany, a shift dummy and time trend is included since 1991 for the full sample estimates.

Table 5. Fiscal rule, (1) and (6), German federal 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 (0.00) | | | | |
| | [1979;1984] | [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; for the specification for Germany, a shift dummy and time trend is included since 1991 for the full sample estimates.

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

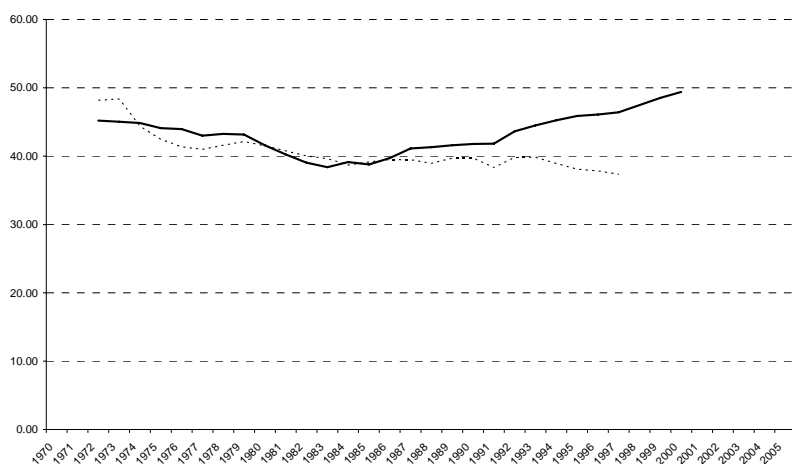
| | all Länder | | old Länder | | | | new Länder | |
|------------------------|------------------|-----------------|-----------------|-----------------|------------------|------------------|-----------------|-----------------|
| | 1970-2005 | | 1970-1990 | | 1991-2005 | | 1991-2005 | |
| | (1) | (6) | (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; for the specification for Germany, a shift dummy and time trend is included since 1991 for the full sample estimates.

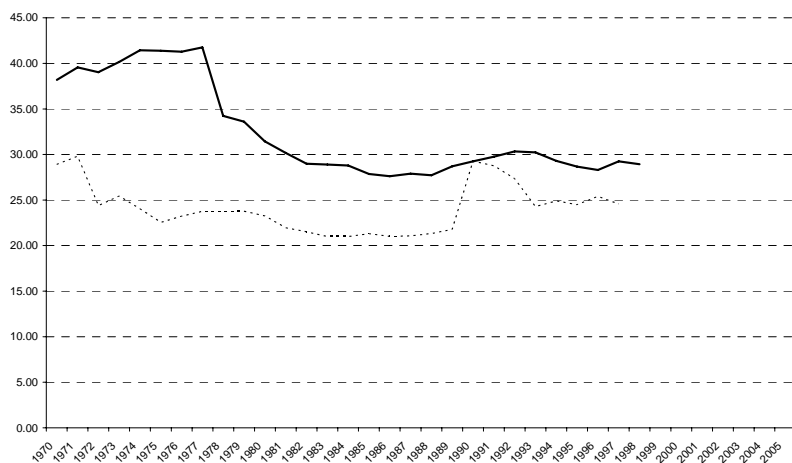
FIGURES

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

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

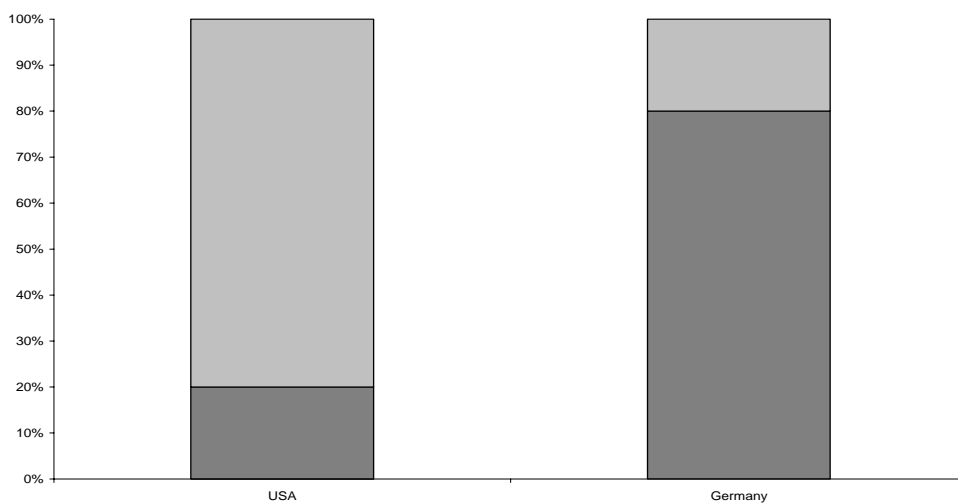


(b) sub-national grants share (% total sub-national revenues)



— USA - - - - Germany

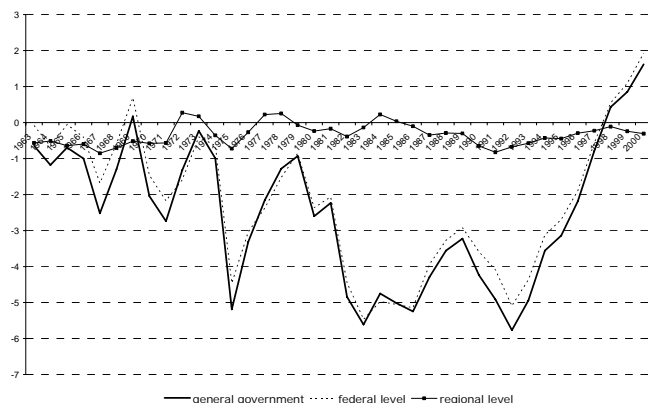
(c) sub-national own-source revenues versus shared revenues (%total sub-national revenues)



shared revenues + transfers — own resources —

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

(a) surplus to GDP ratio



(a) debt to GDP ratio

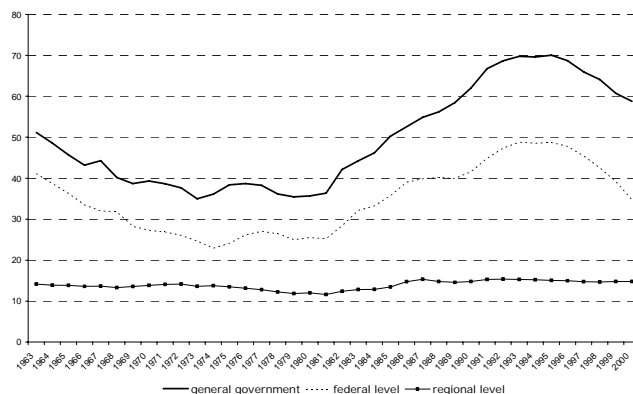
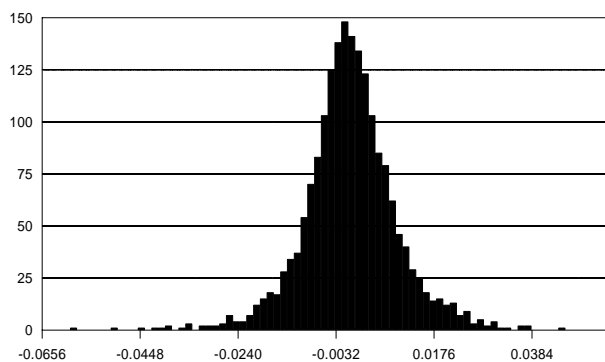


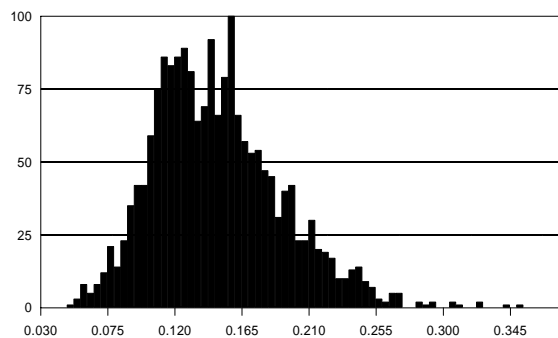
Figure 3. United States, 1963-200: histogram of fiscal data.

(a) surplus ratio (% of state GDP)



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

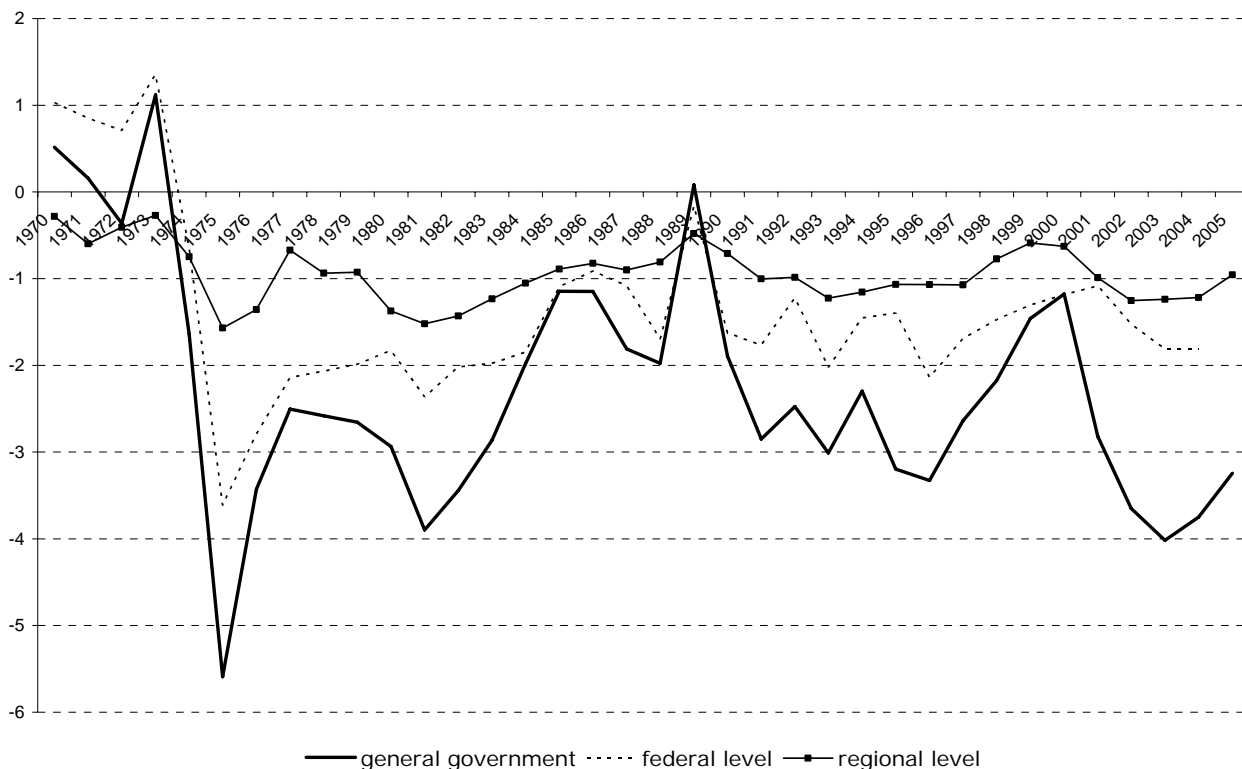
(b) debt ratio (% of state GDP)



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

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

(a) surplus to GDP ratio



(b) debt to GDP ratio

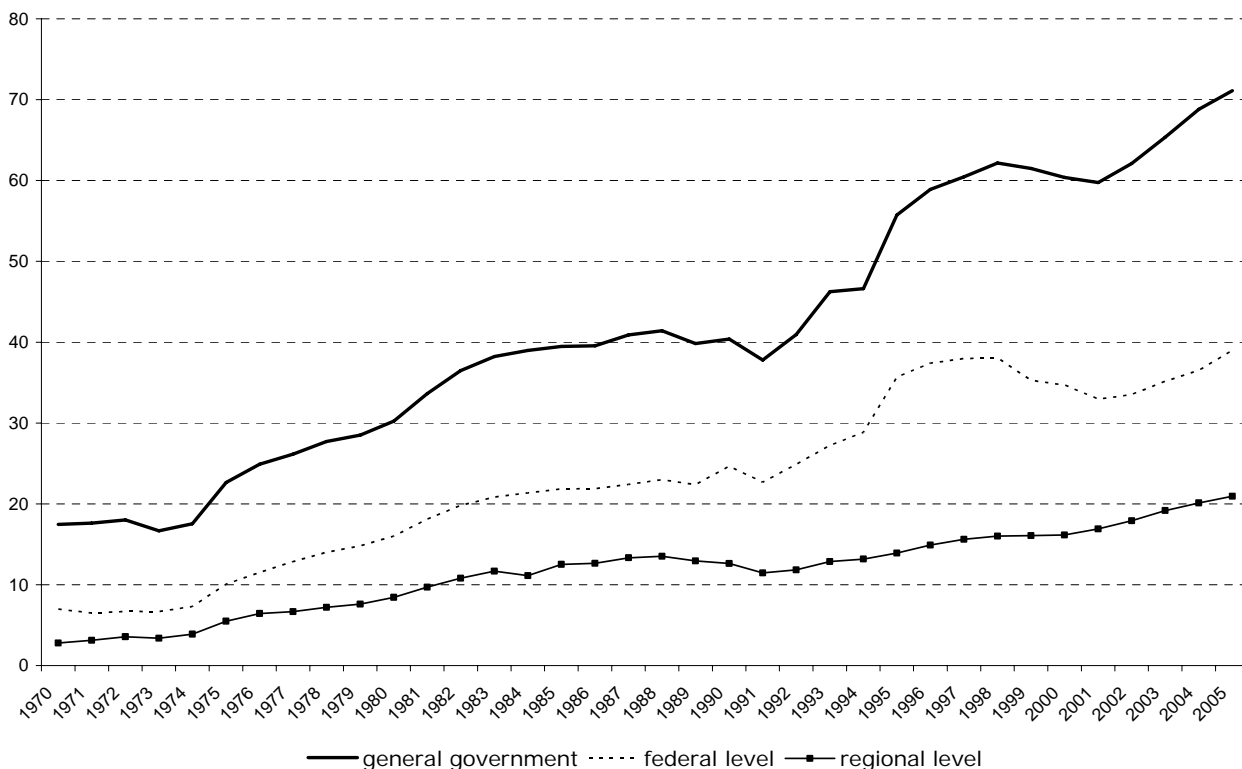


Figure 5a. State debt ratio for German Länder (% of state GDP).

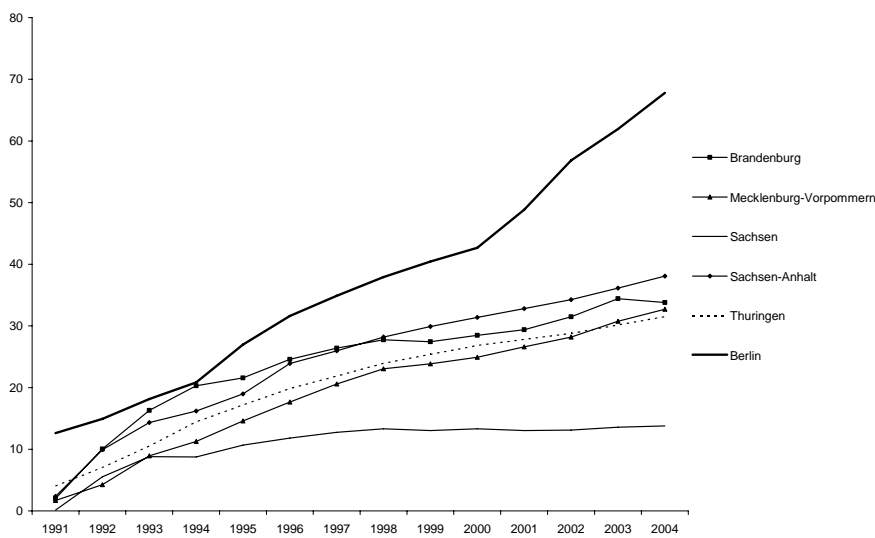
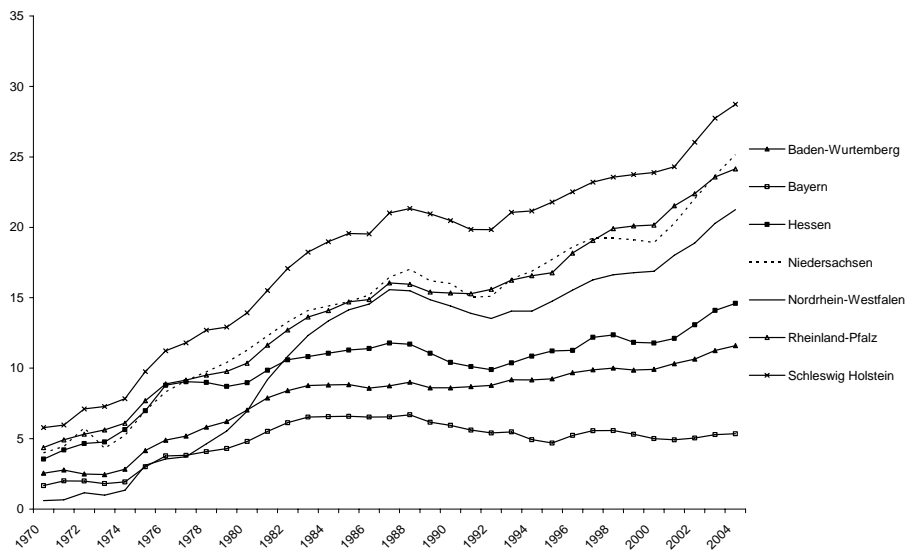
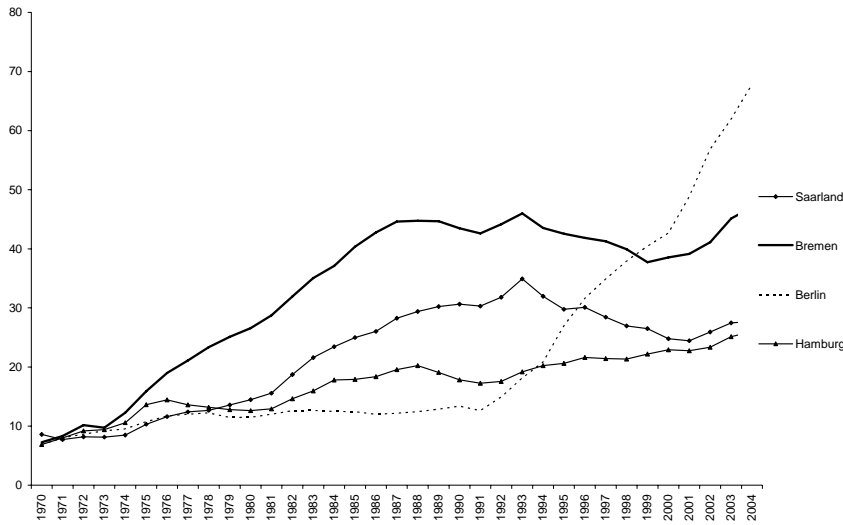
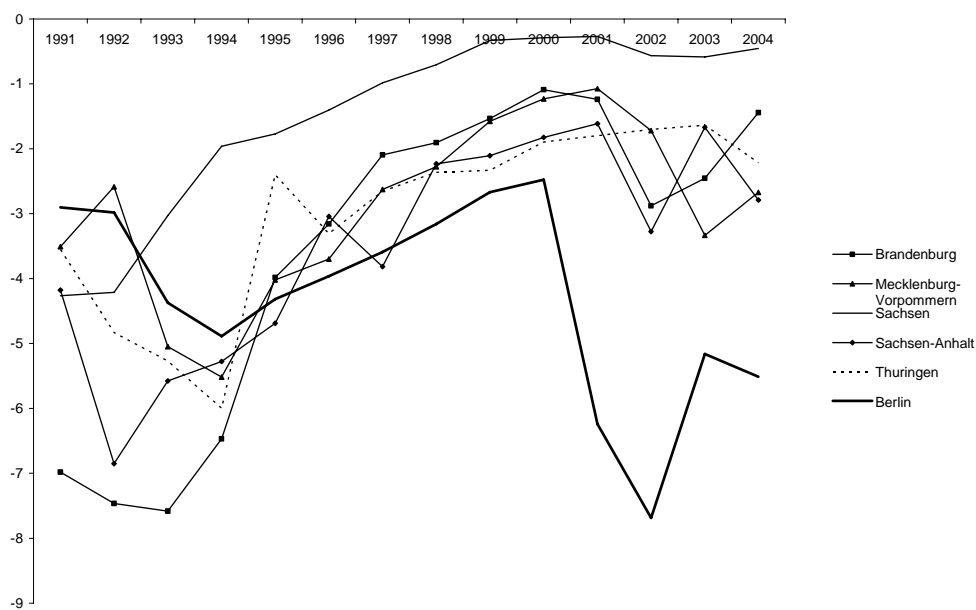
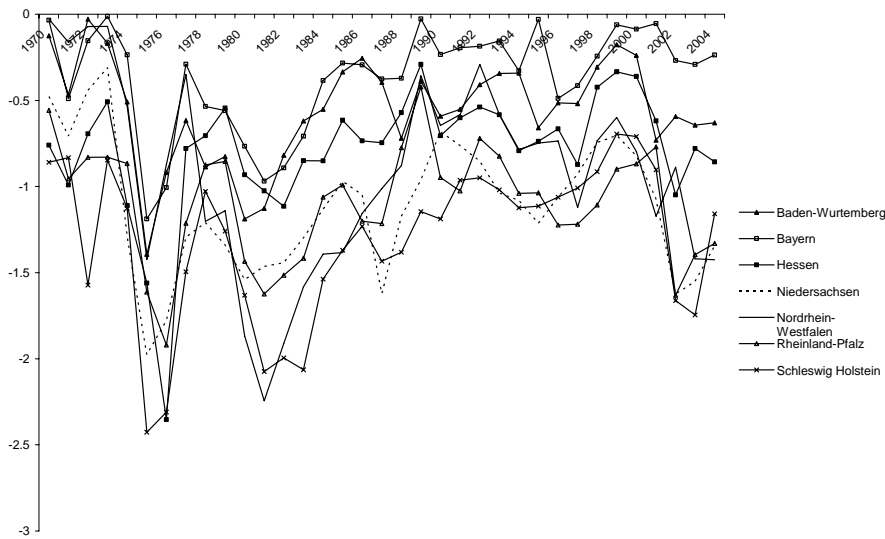
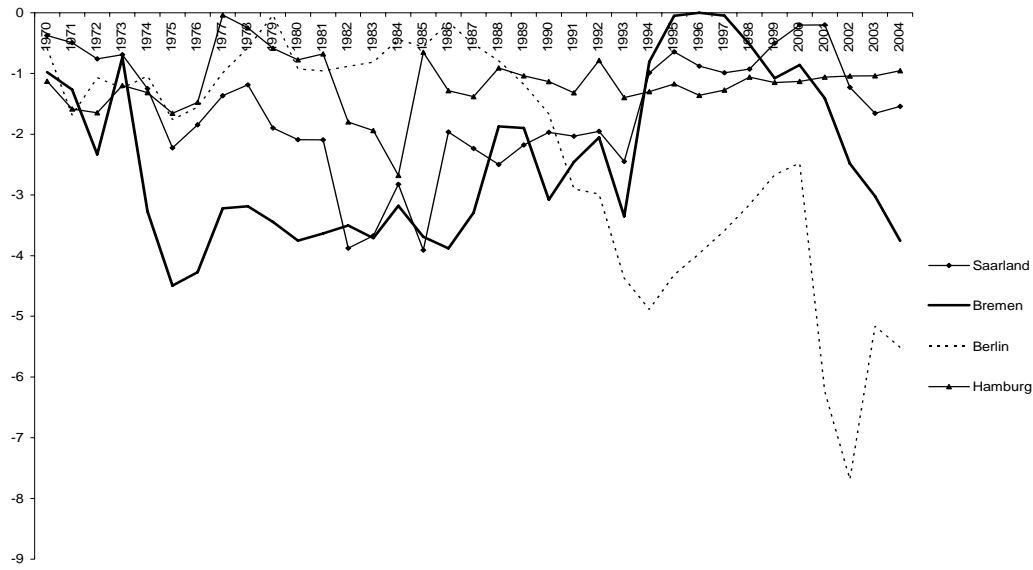


Figure 5b. German Länder: state surplus ratio (% of state GDP).





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