Testing the FTPL across government tiers[*]

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Abstract: Control on regional government budgets is important in a monetary union as lower tiers of government have fewer incentives to consolidate debt. According to the Fiscal Theory of the Price Level; unsustainable non-Ricardian fiscal policies eventually force monetary policy to adjust. Hence, uncoordinated and non-regulated regional fiscal policies would therefore threaten price stability for the monetary union as a whole. However, the union central bank is not without defense. A federal government that internalises the spillover effect of non-Ricardian fiscal policies on the price level can offset non-Ricardian regional fiscal policies. A federal government, which taxes and transfers resources between regions, may compensate for unsustainable regional fiscal policies so as to keep fiscal policy Ricardian on aggregate. Following Canzoneri et al. (2001), we test the validity of the Fiscal Theory of the Price Level for both federal and regional governments in Germany. We find evidence of a spillover effect of unsustainable policies on the price level for other Länder. However, the German federal government offsets this effect on the price level by running Ricardian policies. These results have implications for the regulation of fiscal policies in the EMU.

Keywords: sustainability, fiscal policy, FTPL, fiscal federalism.

JEL codes: E61, E62, H11, H72, H77.

1. INTRODUCTION

Fiscal discipline is not assured if the fiscal relations between different governments in a monetary union, like the EMU, are not clearly spelled out. The root of the problem is free riding between the different fiscal authorities and the single central bank. The benefits of additional spending accrue to the region, but the consequences of fiscal profligacy are spread out over all tiers of government instead of burdening the local population with the cost of fiscal adjustment. The economic (and political) cost of a spending cut, a tax rise or outright default can be shifted to other governments. This cost can also be shifted to the central bank. Debt accumulation by regional governments may pressure the common monetary policy to give in to calls for lower interest rates, and higher inflation (Beetsma and Uhlig, 1999; Chari and Kehoe, 2004). There can also be a direct link from fiscal insolvency to the price level. According to the Fiscal Theory of the Price Level (FTPL), fiscal – rather than monetary – policy determines the price level (Leeper, 1991; Sims, 1994). If the fiscal authority fails to take action to ensure its intertemporal budget constraint is satisfied, and government solvency eventually has to be ensured in real terms, monetary policy can only 'passively' give in to a non-Ricardian fiscal policy. The implications of the FTPL in the context of monetary union are relatively straightforward. It is sufficient to have one insolvent government that sets policy 'actively' to have it determine the price level for the union as a whole (Bergin, 2000; Canzoneri *et al.*, 2001).[1] Thereby, fiscal solvency cannot be guaranteed for any other government in the monetary union.

The existence of soft budget constraints in a monetary union requires a control system on the sustainability of public finances. In EMU, the deficit rule of the Stability Pact and the no-bailout clause of the Treaty separate responsibilities between the various national fiscal policies. Federal fiscal structures usually have a more complex regulation of fiscal policies, however. Unlike EMU, most monetary unions like Germany, the US, Brazil or Argentina have a federal government that takes care of aggregate union interests, and whose authority usually precedes that of the second tier of regional governments. Whereas there usually is a constitutionally determined division of spending tasks between these different tiers of government, tax revenues are shared. In addition to (horizontal) transfers between regional governments, (vertical) transfers from the federal government complement regional budgets. The federal government may provide the necessary fiscal means to pay off debt. These transfers of wealth from one level to the other can offset the effect on monetary policy. *Ex ante*, tax sharing agreements and joint spending schemes often provide implicit additional

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[1] Except in the case in which this price level would be exactly right to offset the debt position of other governments.

financing of regional budgets. *Ex post*, and in extreme cases, this may even entail an 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). However, these models are often much stylised, and do not grasp all institutional and economic aspects of fiscal federalism.

In this paper, we give empirical evidence for these interactions between government tiers by using data on the federal and regional budgets in Germany. We use a test developed by Canzoneri *et al.* (2001) for distinguishing Ricardian from non-Ricardian fiscal regimes. We look into the responses of shocks to the surplus ratio on public debt, and the autocorrelation properties of the surplus, to tell whether the fiscal policies of federal and lower tier governments are 'active' or 'passive'. In contrast to previous studies that tested FTPL on consolidated general government data, we look into the effects of federal and regional fiscal policies, and their interplay, on the price level. We find that some regions are running unsustainable fiscal policies. These non-Ricardian policies spillover to the other regions: a panel VAR shows that on aggregate, regional budgets are unsustainable. In contrast, federal fiscal policy is Ricardian. Actually, the federal government offsets regional fiscal problems as we do not find evidence that fiscal series for the general government are non-Ricardian. We interpret this as evidence that the German federal government internalises the effect of regional fiscal policies on the common monetary policy stance. The free riding result between the various regional governments vis-à-vis the general government (federal government plus central bank) still holds. However, the federal government shields the central bank from non-Ricardian policies.

This paper is structured as follows. In section 2, we discuss the applications of the FTPL in a federation. We extend the test for classifying Ricardian and Non-Ricardian regimes in fiscal policy to different government tiers. We present some data on the structure of fiscal policy in Germany. We discuss the results in section 3. Policy implications are discussed in section 4.

2. SUSTAINABILITY OF FISCAL POLICIES UNDER A COMMON CURRENCY

Starting point for the discussion is the flow government budget constraint. This describes the period-by-period dynamics of total debt b_t as the accumulation due to interest payments on past fiscal imbalances and the current primary surplus, which is the difference of government revenues T_t – inclusive of seigniorage revenues M_t – and government spending G_t. All variables in (1) are expressed in nominal terms.

$$B_t = (T_t - G_t) + (M_{t+1} - M_t) + \frac{B_{t+1}}{(1+i_t)} \qquad (1)$$

We can rewrite the flow budget constraint in terms of total government liabilities, and take into account economic growth by scaling to GDP. We then get

$$\frac{M_t + B_t}{P_t Y_t} = \left[\frac{T_t - G_t}{P_t Y_t} + \left(\frac{M_{t+1}}{P_t Y_t} \right)\left(\frac{i_t}{1+i_t} \right) \right] + \left(\frac{Y_{t+1}/Y_t}{(1+i_t)(P_t/P_{t+1})} \right)\left(\frac{M_{t+1} + B_{t+1}}{P_{t+1} Y_{t+1}} \right). \qquad (2)$$

Total government liabilities have to equal the primary surplus (as a ratio to GDP) plus the discounted value of next period's total liabilities. This discount factor is the ratio of real GDP growth to the real interest rate. If w_t is the ratio of liabilities to GDP (including base money plus government bonds), s_t the surplus to GDP ratio, and α_t the discount factor, (2) becomes

$$w_t = s_t + \alpha_t w_{t+1} \qquad (3)$$

By solving forward (3),

$$w_t = s_t + E_t \left[\sum_{t=m+1}^{\infty} \left(\prod_{n=m}^{t-1} \alpha_n \right) s_t \right] \Leftrightarrow \lim_{t \to \infty} E_t \left[\prod_{n=T}^{T+t-1} \alpha_n w_{t+T} \right]. \qquad (4)$$

There are two alternative views on this expression for the present value of liabilities. The common interpretation is that (4) is the intertemporal government budget constraint. The government cannot run unsustainable policies but should pay off, monetise or refinance debt. In contrast, the Fiscal Theory of the Price Level (FTPL) does not interpret this as a constraint to be satisfied, but as an equilibrium condition. This condition can be satisfied in two different ways. The government can behave in the way just described. Fiscal policy endogenously adjusts the sequence $\{s_t\}$ so that it satisfies (4), regardless of the values of nominal income and discount factors. Following Woodford (2001), we call this the Ricardian regime (R).[2] Instead, if the government does not adjust s_t, the surplus is just an exogenous process unrelated to debt. In order to satisfy (4), then either the discount factor or the liabilities to GDP ratio have to adjust. This is the non-Ricardian regime (NR).

If the fiscal authority fails to take actions to ensure its intertemporal budget constraint is satisfied, it is fiscal – rather than monetary – policy that is the nominal anchor for the economy (Leeper, 1991; Sims, 1994). As government solvency eventually has to be ensured in real terms, monetary policy can only 'passively' give in. If fiscal policy is instead sufficiently

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[2] Or passive regime in Leeper's terminology.

reactive to debt, the intertemporal government budget constraint will be satisfied for all possible price paths. Monetary policy retains the ability to control prices in the Ricardian regime. Eventually, the responsibility for the price level is always in the hands of the fiscal authority then.

The discussion on the empirical plausibility of R or NR regimes runs into some identification problems. A formal test for an R or NR regime is impossible. Both regimes are observationally equivalent, and we only observe the equilibrium outcome under each regime. A positive response of the primary surplus to government liabilities does not give an indication on the exact regime. There is indeed a positive relationship between the surplus and total liabilities in an R world: a higher surplus today pays off debt. This is also the argumentation Bohn (1998) gives for the positive debt response in a fiscal rule. Yet, the same positive relationship can also be observed in an NR regime. The causality runs the other way, however: liabilities respond to the expected vale of present and future surpluses. Looking at the contemporaneous correlation between government surplus and liabilities does not give an answer.

Canzoneri *et al.* (2001) propose a test that is based on (a) the response of liabilities to innovations in the surplus, and (b) the serial correlation of the surplus.[3] They distinguish between both regimes by the sign of the serial correlation of the surplus. The argument that a negative correlation makes the NR regime theoretically implausible, runs as follows. A positive innovation in the surplus that moreover raises future surpluses implies that public debt is being paid off. Government liabilities fall after a positive shock to the surplus. This is an R regime. It would also be clear that there is an NR regime in two different cases. First, the rise in the surplus does pay off debt, but due to the revaluation effect of nominal income in the NR regime, liabilities increase. The net effect is nil. The surplus s_t does not correlate with future surpluses then. Second, there is also an NR regime in case future liabilities should rise after the surplus innovation and the shock to the surplus is positively correlated with future surpluses. But there is a third NR regime that gives the same prediction for the fall in liabilities as in the R regime. After a positive shock to the surplus, nominal income and/or the expected future fiscal surpluses must move to achieve fiscal balance in the NR regime. Future liabilities would fall in an NR regime if the shock to the surplus is negatively correlated with future surpluses. Given that we usually observe positive serial correlation in surpluses, it is only possible to make this occur if there were to be a strong negative correlation of the surplus at longer horizons. Moreover, these deficits would need to be so large to make the

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[3] For different attempts to test the FTPL, see Cochrane (1998), Hetzel and Leach (2001), Woodford (2001) or Sala (2004).

present value of surpluses fall. This implies that deficits are so large, persistent or heavily discounted that they can offset the initial increase in the surplus.[4] Expression (3) does not only allow for changes in nominal liabilities. The stochastic discount factors $\{\alpha_t\}$ may move as well to make the budget constraint hold in equilibrium. A negative correlation of surpluses with future discount factors would make the NR regime more plausible.

In summary, the positive correlation between s_t and w_t does not allow distinguishing between an R and NR regime. However, we can distinguish the regimes by looking (a) at the impulse responses in a VAR including the surplus and liabilities, and (b) the autocorrelation function of the surplus. We also add the discount factor to this VAR to check the results for a possible impact of the surplus. The identification assumption in this VAR is a simple cholesky ordering. Both orderings of surplus and debt are equally possible.[5] If we order the surplus first, the innovation to the surplus is indeed an exogenous shock. This makes more sense in an NR regime. This allows for a contemporaneous response in the liabilities ratio: nominal GDP (or discount factors) jumps to ensure that outstanding liabilities equal the expected present value of surpluses. In contrast, if we order liabilities first, nominal GDP might be determined exogenously. We can identify a shock to the surplus to GDP ratio that does not have a contemporaneous impact on liabilities. This ordering would favour an R regime. A rise or a non-significant response of liabilities to a shock in the surplus indicates non-Ricardian fiscal policy. A fall in liabilities is only consistent with an NR regime in case the surplus displays negative serial correlation. In order to allow for the jump in nominal income in the NR regime, we express both the surplus and government liabilities as a ratio to GDP.

The implications of the FTPL in the context of monetary union are relatively straightforward. All regional governments will pursue 'active' policies and run up deficits. It is sufficient to have one insolvent government that sets policy in a non-Ricardian way to have it determine the price level for the union as a whole (Bergin, 2000; Canzoneri et al., 2001). A rise in the level of debt in one region spills over to the common price level of monetary union. Thereby, fiscal solvency cannot be guaranteed for any other government in the monetary union.[6] As a

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[4] Canzoneri *et al.* (2001) go on arguing that this negative correlation makes the NR regime implausible. If the government decides to raise the surplus today, it would change its policy into a deficit at some time in the future. But given that the surplus in an NR regime is determined by an exogenous process, this change in policy should happen for some exogenous reason that is not related to the level of public debt. The economic model behind this behaviour of the government is not clear. Cochrane (1998) makes some suggestions, however.

[5] We order α last.

[6] A possible solution to this problem is to impose a limit on regional government budgets. A deficit or debt rule ensures solvency of each regional government and rules out the possibility that one region may set the price level.

consequence, an NR regime in one region is sufficient to find effects of the region's fiscal policy on prices in all other regions, and in the aggregate.

However, there are two cases in which this result does not need to hold. First, the common price level could be exactly right to offset the debt position for each regional government. Second, and more importantly, fiscal solvency is not strictly necessary for each member government in a monetary union to maintain a stable price level. There are multiple regional budget constraints but the aggregate government budget constraint can still be viewed as jointly determining the price level. There are several ways in which the budget constraint of a non-Ricardian government may be satisfied by transferring resources to the region with unsustainable fiscal policies. Cross-regional transfers (such as transfers *ex* ante, or a bailout *ex post*) would allow several governments to be insolvent without effects on the price level as long as overall sustainability is maintained (Bergin, 2000). This is not a stable solution, however: citizens of one region might not be willing to continuously transfer wealth to cover budget deficits in other regions without eventual repayment.[7] There are (political) limits on international risk sharing (Sims, 1999). In a political federation, these limits are less binding. The federal government can tax all individuals and transfer resources across regions. It can do so by explicitly bailing out regions *ex post* or implicitly provide additional resources *ex ante* (by awarding additional grants to the regional budget). Wealth transfers between regions are not uncommon. These transfers can also be sustained over time. Their level depends on the political equilibrium in the federation.

As a consequence, the federal government is an additional player in the game between central bank and the regions. Even if the central bank cannot commit to a tough monetary stance, a federal government that is concerned about the spillover effect on the common price level of unsustainable regional policies can offset the inflationary effect. There is no need that regional governments give up their lax policies, or the central bank to commit for this result to hold. Eventually, fiscal policy at regional level can still be unsustainable. Fiscal and monetary policy will not need to follow a non-Ricardian regime, thanks to the strict budget stance of the federal government. In this way, the federal government eventually solves the free riding problem for aggregate variables. The existence of a federal government is an effective commitment device. It does not directly solve the problem of free riding at the regional level. In fact, it prevents the central bank from engaging in a non-Ricardian policy. However, in a monetary union, and in the absence of a federal government,

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[7] Solidarity between citizens of different regions spurs much political debate in federal countries. The debate usually focuses on the level of redistribution between poor and rich regions, much less so on the inflationary consequences of regional budgets.

NR behaviour of one government leads to a NR outcome for all governments of the same tier.

3.   METHODOLOGY

3.1.   Testing the FTPL in a federation

Applications following Canzoneri *et al.* (2001) have typically tested the FTPL for general government data.[8] We simply extend this FTPL test for different government tiers. The predictions are rather different whether we test FTPL in a monetary union like EMU, or a political federation.

As previously mentioned, in a monetary union, and in the absence of a federal government, NR behaviour of one government leads to a NR outcome for all governments of the same tier. We thus need to test first whether each regional government runs a Ricardian or non-Ricardian fiscal policy. We do so with a VAR in surplus, liabilities and discount factors. If we find that in at least one region fiscal policy is non-Ricardian, then the empirical prediction is that regional fiscal policies are in an NR regime on aggregate. This is nothing else than verifying the arguments put forward by Sims (1999) and Bergin (2000). We do so by testing the surplus-debt relation in a panel VAR.

The main novel proposition is that the federal government internalises the spillover effect of NR policies on the price level. If there is indeed free riding among regional governments, the federal government might compensate for this with a Ricardian policy. But finding a federal R regime is not sufficient for independence of the central bank. If the federal government indeed redistributes resources among regions, then the consolidated budget series should behave as in an R regime. We can verify this only if we can show that general government budget series are Ricardian.

Testing the FTPL on different government levels involves some issues on the data to use. Strictly speaking, government liabilities include government debt as well as the money base measured at the beginning of the fiscal year. Both series are then divided by nominal GDP of the current year. A division of the money base on a regional basis is not possible. There are simply no data series available. Moreover, in many countries, as in Germany or indeed EMU, the constitution prohibits direct central bank financing of regional budgets. As a

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[8] Brazil (Tanner and Ramos, 2002), UK (Janssen *et al.*, 2002), or Germany and Spain (Thams, 2007).

consequence, we choose to exclude the money base also from the federal and general government data.[9] A second issue in a monetary union are the discount factors to use. We may approximate these with the yield on government bonds. However, regional interest rates on government bonds are available over a brief period of time only and the spreads between regional interest rates are negligible (Fitch, 2005). We choose the German 'federal' interest rate on one year government bonds, although this is an exogenous variable for the German regions. As the discount factor is not endogenous, we simply control the surplus-debt relation for possible jumps in it.

3.2.　　The 'Bundesrepublik Deutschland'

Germany is an interesting example to test fiscal regimes on different government levels. Both the federal and the regional governments (*Länder*) have important fiscal powers. German regional policies are as important as the federal budget in determining the overall budget balance. Each has under control about half of total public spending. There is one big government confronting 16 smaller players. There are fiscal transfers between the federal government, and among the 16 Länder. 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. These are further complemented with vertical transfers from the federal level to further reduce economic disparities and finance specific tasks. Germany is an interesting example for another reason too. Fiscal problems have been common, and the federal government has come to the rescue of two Länder in the early nineties (Saarland and Bremen) with a bail out.

Data on German fiscal policies come from different sources. General government series are from the OECD.[10] Data for the federal 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. Fiscal data are consolidated across Länder and towns. The series include the horizontal transfers between Länder, and the vertical transfers from the federal government. Land GDP comes from the revised data from the *Volkswirtschaftliche Gesamtrechnungen der Länder.* Data cover the sample 1970-2005, and are annual. 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

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[9] The classification of fiscal policy as R or NR does not change if we add the money base.
[10] We cleaned the German data for the sale of the UMTS licenses, which had an unusually large budget impact in 2000.

when we consider the full sample. In addition, we 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.

The aggregate deficit of the Länder has been rather constant since the seventies at about 1% (figure 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 1

We have displayed the deficit ratios for the German Länder in figure 2. 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 2 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.[11] 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

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[11] The only exception here is Sachsen.

Länder has not been kept (figure 3). 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 the German average of about 35%. Berlin and Bremen, and to a lesser extent Saarland, are accumulating ever more debt.[12]

FIGURE 2

FIGURE 3

These figures do not suggest a clear positive correlation between the surplus and debt. Fiscal policy, whether at the central or regional government level, seems to have responded only sporadically to the rising level of debt. Persistent deficits put public debt on a rising trend. We turn to a detailed empirical analysis of these series to discern R from NR regimes.

3.3.   Results: The spillover of regional fiscal policies

The VAR includes the surplus ratio, the liabilities ratio and the exogenous discount factor (and a constant). Both variables are expressed as a ratio to GDP. The BIC test indicates that the optimal length of the VAR is two years. We present in the main part the results for a VAR in which liabilities are ordered first. The impulse response functions are computed for a one standard deviation shock to the surplus ratio, and are plotted with 95% asymptotic error bounds.

Let us first look at the behaviour of the fiscal policies of the Länder. We are mainly interested in the sign of the debt response after an innovation in the surplus. For parsimony, we present the accumulated responses at a horizon of two, five and eight years and their significance in table format. Table 1 shows that there in most Länder, the accumulated response to a surplus shock is negative. This response is also significant. Moreover, the autocorrelation function in table 2 shows that surpluses are positively correlated. This would indicate that most regions are running a Ricardian policy.

TABLE 1

TABLE 2

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

There are a few exceptions, though. A closer look at tables 1 and 2 shows that there are a few regions in which fiscal policy is non-Ricardian. First, a shock to the surplus in Bremen is followed by rises in liabilities. Given that the surplus is positively serially correlated, fiscal policy must be NR. Second, there are two Länder, Hessen and Hamburg, where the response of liabilities is not significant after a surplus shock. With positive serial correlation for at least three years after the shock, fiscal policy can be classified as NR. Finally, the surplus to GDP ratio in Sachsen and Thüringen displays negative serial correlation at short horizons. In Sachsen, the serial correlation turns negative after one year already. At longer horizons, this negative correlation becomes even larger, but is hardly significant. In Thüringen in contrast, the correlation becomes negative after two years and is large and significant. At longer horizons, it turns positive again. For both Länder, this would again indicate an NR regime.

This result is quite striking, given that most of the tests for FTPL have found well behaved Ricardian fiscal regimes. Can we associate the NR regime with a particular fiscal policy? The NR regime in Bremen should not come as a surprise. This was one of the two regions to be bailed out by the federal government in 1992 after debt reached nearly 50% of regional GDP. Hessen and Hamburg have been running very stable fiscal policies instead. Actually, both are among the richest Germany regions in per capita income. Both Länder are important net contributors to the *Finanzausgleich*. The surpluses they create are skimmed of to regions with fiscal trouble. This result tells that there are also significant transfers between regions.

The focus here is on the interaction between different regional governments. According to our discussion in section 2, a single NR policy would suffice for making the regime NR for all governments. We confirm this result on two accounts. First, we run a panel VAR with the same specification. We use a similar Cholesky ordering of the variables as before. The initial response to a shock in the surplus is a rise in liabilities. At longer horizons, liabilities start to fall but this fall is never significant (table 1). Even if we cannot compute the serial correlation of the surplus, regional fiscal policy can clearly be classified as NR. Second, we simply aggregate the regional budget data. The previous results suggest horizontal transfers might offset NR policies. By aggregating the surplus series, we net out the effect of horizontal transfers between regions. The finding of an NR regime for this hypothetical single regional government should be stronger then. Indeed, the impulse response after a surplus shock shows that liabilities continue to rise until ten years after (figure 4). As the serial correlation of this hypothetical surplus is positive, regional fiscal policy is certainly in an NR regime. Both results confirm the spillover effect of an NR regime to all governments in the monetary union.

FIGURE 4

One might wonder if the results are not due to particular structural breaks. The German fiscal system has undergone many changes since 1970. A major break of course is German Reunification. The federal government initially bore the brunt of the burden and financed the transition with public debt. Since 1995, the former Eastern German regions are incorporated in the *Finanzausgleich*. The basic structure of the German federation has remained, however. We find that splitting the sample period in 1990 does not lead to different results (table 3). The German fiscal system is characterised by NR regimes both before and after the Reunification. Before 1990, only a VAR on aggregate regional budget indicates an NR regime (whereas the panel VAR does not). After 1990, a few regions follow NR policies. The overall regime is NR. The reform of the fiscal system has affected the amount of transfers, but has not led to an overhaul of the interactions between the federal government, the central bank and the regions.

TABLE 3

3.4. Results: The federal budget offsets non-Ricardian policies

Does fiscal profligacy at the regional level affect the decisions of the federal government? It can only shield the Bundesbank from the fiscal pressure of the Länder if it manages to balance the NR regime with a budget that responds to the level of outstanding liabilities. For this, the federal government should run a Ricardian policy. This policy is also what we find in the VAR. Future liabilities fall after a positive innovation to the surplus (table 1, figure 5). The positive serial correlation makes us discard the possibility of a NR regime.

FIGURE 5

The budget policy of the federal government may not be Ricardian enough to offset the effect of the NR policies of the Länder. From the previous results, it is clear that the federal government has not provided (vertical) transfers to all regions to offset the NR policy. It can still do so by compensating within its own budget. We can analyse this by looking at consolidated data of the general government. The impulse response function shows that liabilities continue to fall after a positive shock to the surplus (table 1, figure 6). Moreover, with a positive autocorrelation in the general government surplus, fiscal policy can only be Ricardian (table 2). Hence, fiscal policy in Germany is Ricardian. This confirms findings by Thams (2007) of a Ricardian regime. We show that a Ricardian regime is the combination of

non-Ricardian regional policies and a federal Ricardian budget. The latter stems the spillover effect of the former on aggregate economic variables.

The result is robust over different sample periods. Despite the burden of Reunification on the federal budget, federal policies follow an R regime both before and after 1990. This again suggests that it is the interaction between the various fiscal policies and the single monetary policy that matters for the final outcome.

The way in which this can be practically achieved is less clear cut. We find that some regions pursue Ricardian policies, while others do not. The finding of a strong NR regime for the aggregate regional budget suggests that horizontal transfers play an important role in mitigating unsustainable policies. The *Finanzausgleich* compensates between regions. But the fiscal situation of the regions is still deficitary on aggregate. The effect of the vertical redistribution of resources is less clear cut. Vertical federal transfers do not offset the NR regimes at regional level. A transfer must then occur from at least some other regions in order to make the Ricardian policy of the federal government possible. The federal government taxes all citizens in all regions. It must tax the regional resources relatively more to pursue its Ricardian policy. Only in this way, it can compensate within its own budget sufficiently so as to make fiscal policy Ricardian on aggregate. This has also implications for the role of the federal government over time. The financing of regional deficits strengthens its bargaining position. The implicit tax transfers eventually allow the federal government to finance more tasks than regions do. The increasing role of the German federal government in (co)financing public spending is a phenomenon we indeed observe (Seitz, 1999)

4. CONCLUSION

In monetary union, governments may pursue unsustainable fiscal policies and free ride on the efforts of other fiscal authorities to come to its rescue. It also exposes the single central bank to pressure to relax its stance. The effects of non-Ricardian policies spill over to all other governments in the monetary union. Fiscal discipline is not assured if the central bank cannot commit to its policy. This requires agreement between governments to constrain the use of fiscal policy. There is also another mechanism, however. Most monetary unions have a federal government, and a second tier of regional governments. The federal government may provide the necessary fiscal means to pay off debt. *Ex ante*, tax sharing agreements and joint spending schemes often provide implicit additional financing of regional budgets. *Ex post*, in extreme cases, this may even entail an explicit bail out. The federal government internalises the effect of regional fiscal policies on the common monetary policy stance. If the

commitment of the central bank or the set of fiscal rules is not credible, the federal government may still shift resources to keep these inflation pressures at bay.

We use a test developed by Canzoneri *et al.* (2001) for distinguishing Ricardian from non-Ricardian fiscal regimes to give evidence for this proposition by using data on the federal and regional budgets in Germany. The main finding is that the spillover effects from the regions that are running unsustainable fiscal policies are indeed countered by the federal government. The free riding result between the various regional governments vis-à-vis the general government (federal government plus central bank) still holds. However, federal fiscal policy has provided a mechanism to avoid that fiscal policies on aggregate are non-Ricardian. In this way, the federal government has protected the independence of the Bundesbank. We interpret this as evidence that the German federal government internalises the effect of regional fiscal policies on the common monetary policy stance. At this stage, we cannot identify the means by which the federal government does so. The federal government could either compensate for insolvency at the regional level by running a strict central budget; or alternatively, it might shift resources between governments with taxes and transfers. In both cases, non-Ricardian regional fiscal policies do not give rise to aggregate rises in the price level. We need more detailed data on the amount of horizontal and vertical transfers between federal government and Länder to distinguish such policies.

There are other examples of federations in which regional fiscal policies create macroeconomic havoc, with implications for monetary policy. In Argentina, the Finance Minister Cavallo eventually had to give in to the pressure of provincial governors that run loose budgets. This precipitated the collapse of the currency board and sparked hyperinflation in 2002. Germany or Argentina are examples of countries where federal relations involve a power game between different tiers and the common central bank. Fiscal power is balanced between the federal level and the regions. Not all fiscal federations have an identical structure. In some federations, a too strong centre may impose strict rules on weak regional governments. In others, a weak federal government could instead be in the political hands of the regions, and be fiscally too weak to stand between the regions and the central bank. This structure probably depends on historical political circumstances.

This result has quite some implications for fiscal policy in a monetary union. The federal government may shield the common central bank that is not able to commit. But the existence of the federal government itself exacerbates the free riding problem. Indeed, our results do not say that the ECB is bound to give in to fiscal pressure because there is no European government backing the bank. First, the central bank can still commit to a tough

anti-inflationary stance. Second, a monetary union without a government with fiscal power is an effective commitment not to bail out member states. The worries that a single federal government could challenge the single central bank are not really founded. Having an important fiscal power at EU level would change the interaction between member states, however. Also, this federal government could itself be biased to run unsustainable policies, something we did not consider in this paper. The choice to grant a European government fiscal power is a political one, of course.

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TABLES

Table 1. Accumulated IRFs of the liabilities/GDP ratio to a shock in the surplus ratio.[a]

years after the shock	2y	5y	8y
Baden-Württemberg	-0.0015*	-0.0050*	-0.0089*
Bayern	-0.0013*	-0.0037*	-0.0059*
Hessen	-0.0002*	0.0035	0.0092
Niedersachsen	-0.0120*	-0.0345*	-0.0565*
Nordrhein Westfalen	-0.0034*	-0.0136*	-0.0267*
Rheinland Pfalz	-0.0037*	-0.0100*	-0.0163*
Saarland	-0.0065*	-0.0258*	-0.0495*
Schleswig Holstein	-0.0053*	-0.0178*	-0.0315*
Berlin	-0.0176*	-0.0648*	-0.1270*
Bremen	-0.0030	-0.0199	-0.0442
Hamburg	-0.0005	-0.0024	-0.0048
Brandenburg [b]	-0.0084*	-0.0181*	-0.0249*
Mecklenburg Vorpommern [b]	-0.0021*	-0.0104*	-0.0192*
Sachsen [b]	-0.0078*	-0.0188*	-0.0302*
Sachsen-Anhalt [b]	-0.0117*	-0.0438*	-0.0873*
Thüringen [b]	-0.0014*	-0.0051*	-0.0092*
panel VAR [c]	0.0143	-0.0068	-0.0445
regional government	0.0067	0.0208	0.0352
central government	-0.0064	-0.0248	-0.0457
general government	-0.0182	-0.0567	-0.0975

Notes: a) cholesky ordering, surplus ordered first, VAR with 2 lags, impulse response for a shock with 1 standard deviation ; b) data are for the period 1991-2005 ; c) panel VAR includes only the old Länder.

Table 2. Autocorrelation function of the surplus ratio.

lag	Baden-Württemberg ACF	Q-stat	prob	Bayern ACF	Q-stat	prob	Hessen ACF	Q-stat	prob	Niedersachsen ACF	Q-stat	prob	Nordrhein Westfalen ACF	Q-stat	prob	Rheinland-Pfalz ACF	Q-stat	prob
1	0.54	11.08	0.00	0.53	10.77	0.00	0.81	11.30	0.00	0.45	7.72	0.01	0.68	7.95	0.01	0.64	15.44	0.00
2	0.24	13.33	0.00	0.20	12.31	0.00	0.53	16.57	0.00	0.09	8.03	0.02	0.39	10.72	0.01	0.13	16.13	0.00
3	0.06	13.48	0.00	0.14	13.11	0.00	0.19	17.27	0.00	-0.16	9.10	0.03	0.15	11.18	0.01	-0.10	16.55	0.00
4	0.05	13.57	0.01	0.21	14.99	0.01	-0.09	17.47	0.00	0.05	9.21	0.06	-0.18	11.87	0.02	-0.10	17.00	0.00
5	-0.01	13.58	0.02	0.19	16.49	0.01	-0.27	19.23	0.00	0.17	10.42	0.06	-0.26	13.54	0.02	-0.04	17.08	0.00

lag	Saarland ACF	Q-stat	prob	Schleswig Holstein ACF	Q-stat	prob	Berlin ACF	Q-stat	prob	Bremen ACF	Q-stat	prob	Hamburg ACF	Q-stat	prob	Brandenburg ACF	Q-stat	prob
1	0.71	19.28	0.00	0.47	8.23	0.00	0.74	20.63	0.00	0.77	10.12	0.00	0.67	7.79	0.01	0.58	12.58	0.00
2	0.48	28.15	0.00	-0.08	8.47	0.01	0.57	33.34	0.00	0.43	13.56	0.00	0.52	12.88	0.00	0.13	13.25	0.00
3	0.35	32.96	0.00	-0.15	9.33	0.03	0.47	42.21	0.00	0.16	14.11	0.00	0.18	13.51	0.00	0.09	13.61	0.00
4	0.16	34.02	0.00	0.04	9.39	0.05	0.27	45.18	0.00	-0.01	14.11	0.01	-0.11	13.78	0.01	0.12	14.22	0.01
5	0.04	34.08	0.00	0.09	9.75	0.08	0.18	46.50	0.00	-0.14	14.62	0.01	-0.18	14.61	0.01	0.12	14.87	0.01

lag	Mecklenburg ACF	Q-stat	prob	Sachsen ACF	Q-stat	prob	Sachsen-Anhalt ACF	Q-stat	prob	Thüringen ACF	Q-stat	prob	federal government ACF	Q-stat	prob	general government ACF	Q-stat	prob
1	0.82	25.77	0.00	0.82	25.77	0.00	0.73	20.05	0.00	0.33	4.13	0.04	0.54	11.10	0.00	0.47	8.73	0.00
2	0.52	36.40	0.00	0.52	36.40	0.00	0.52	30.49	0.00	0.07	4.33	0.12	0.22	13.01	0.00	0.04	8.79	0.01
3	0.38	42.37	0.00	0.38	42.37	0.00	0.45	38.78	0.00	-0.10	4.70	0.20	0.09	13.32	0.00	0.01	8.80	0.03
4	0.31	46.40	0.00	0.31	46.40	0.00	0.30	42.48	0.00	-0.15	5.59	0.23	-0.18	14.59	0.01	-0.15	9.80	0.04
5	-	-	-	-	-	-	0.16	43.56	0.00	-0.45	14.40	0.01	-0.21	16.48	0.01	-0.20	11.50	0.04

Notes: Q-stat and prob indicate the test statistic and p-value for a significant autocorrelation coefficient.

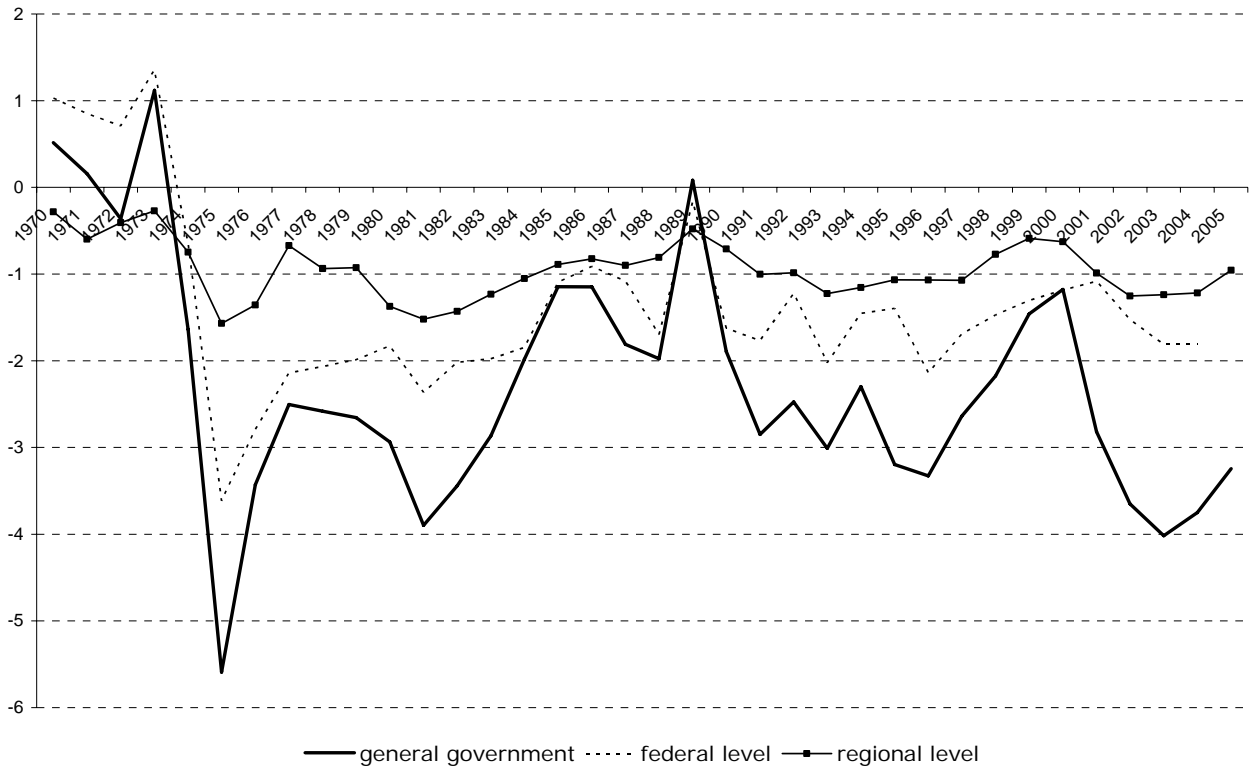Table 3. Accumulated IRFs of the liabilities/GDP ratio to a shock in the surplus ratio. [a]

years after the shock	1970-1990			1991-2005		
	2y	5y	8y	2y	5y	8y
Baden-Württemberg	-0.0017*	-0.0063*	-0.0109*	-0.0020*	-0.0048*	-0.0079*
Bayern	-0.0033*	-0.0092*	-0.0143*	0.0003	0.0010	0.0018
Hessen	0.0014	0.0088	0.0179	-0.0020*	-0.0025*	-0.0033*
Niedersachsen	-0.0157*	-0.0455*	-0.0742*	-0.0059*	-0.0111*	-0.0147*
Nordrhein Westfalen	-0.0090*	-0.0321*	-0.0572*	0.0009	0.0020	0.0035
Rheinland Pfalz	-0.0067*	-0.0175*	-0.0269*	-0.0004*	-0.0006*	-0.0008*
Saarland	-0.0050*	-0.0225*	-0.0465*	-0.0028*	0.0074	0.0126
Schleswig Holstein	-0.0078*	-0.0261*	-0.0454*	-0.0037*	0.0012	-0.0030*
Berlin	-0.0058*	-0.0183*	-0.0316*	-0.0165*	-0.0455*	-0.0827*
Bremen	-0.0039*	-0.0384*	-0.0982*	-0.0005*	-0.0103*	-0.0238*
Hamburg	-0.0019*	-0.0073*	-0.0129*	0.0077	0.0268	0.0510
Brandenburg [b]	---	---	---	-0.0084*	-0.0181*	-0.0249*
Mecklenburg Vorpommern [b]	---	---	---	-0.0021*	-0.0104*	-0.0192*
Sachsen [b]	---	---	---	-0.0078*	-0.0188*	-0.0302*
Sachsen Anhalt [b]	---	---	---	-0.0117*	-0.0438*	-0.0873*
Thüringen [b]	---	---	---	-0.0014*	-0.0051*	-0.0092*
panel VAR old and new [c]	---	---	---	0.0055	0.0121	0.0155
old	-0.0035*	-0.0070*	-0.0116*	0.0074	0.0223	0.0455
new	---	---	---	-0.0191*	-0.0345*	-0.0469*
regional government	0.0093	0.0261	0.0421	0.0040	0.0129	0.0226
central government	-0.0039*	-0.0113*	-0.0189*	-0.0179*	-0.0599*	-0.1066*
general government	-0.0158*	-0.0485*	-0.0827*	-0.0317*	-0.1009*	-0.1752*

Notes: a) cholesky ordering, liabilities ordered first, VAR with 2 lags, impulse response for a shock with 1 standard deviation; b) data are for the period 1991-2005; c) panel VAR includes only the old Länder.

FIGURES

Figure 1. Germany, 1970-2005: fiscal series for government tiers.

(a) surplus to GDP ratio

general government ----- federal level —■— regional level

(b) debt to GDP ratio

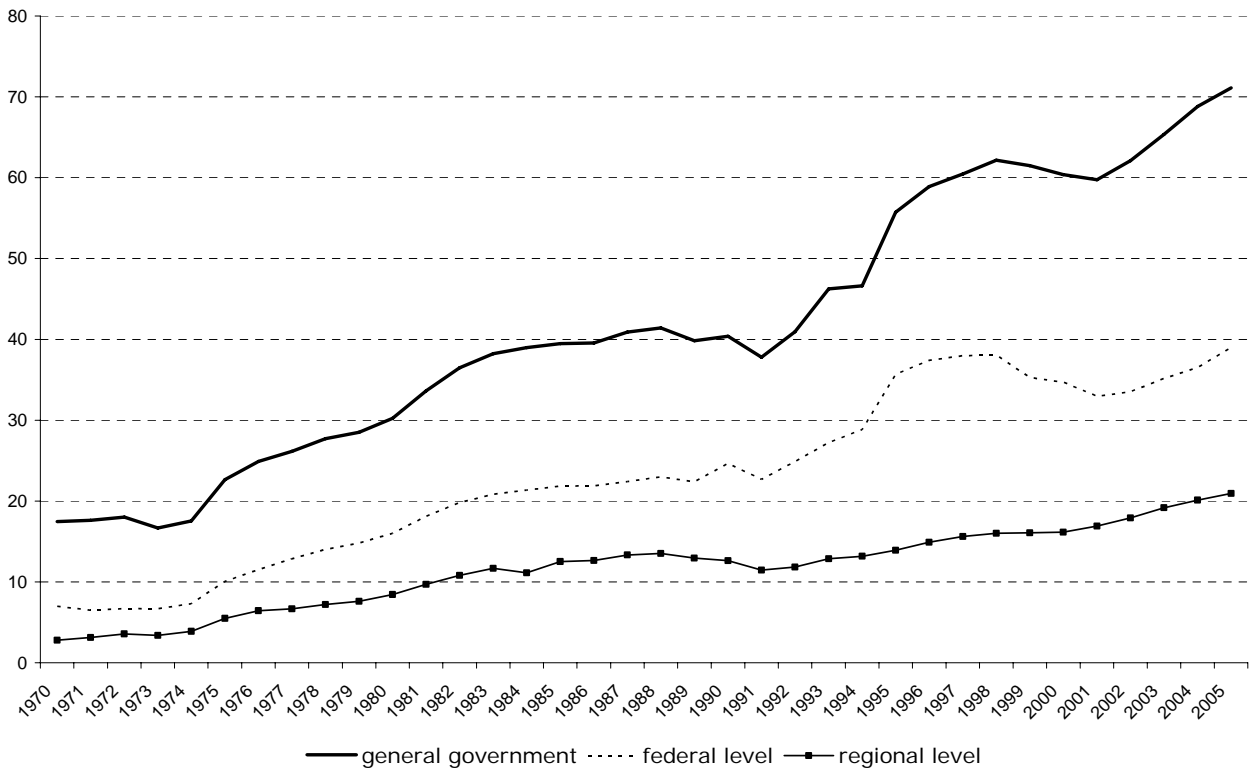general government ----- federal level —■— regional level

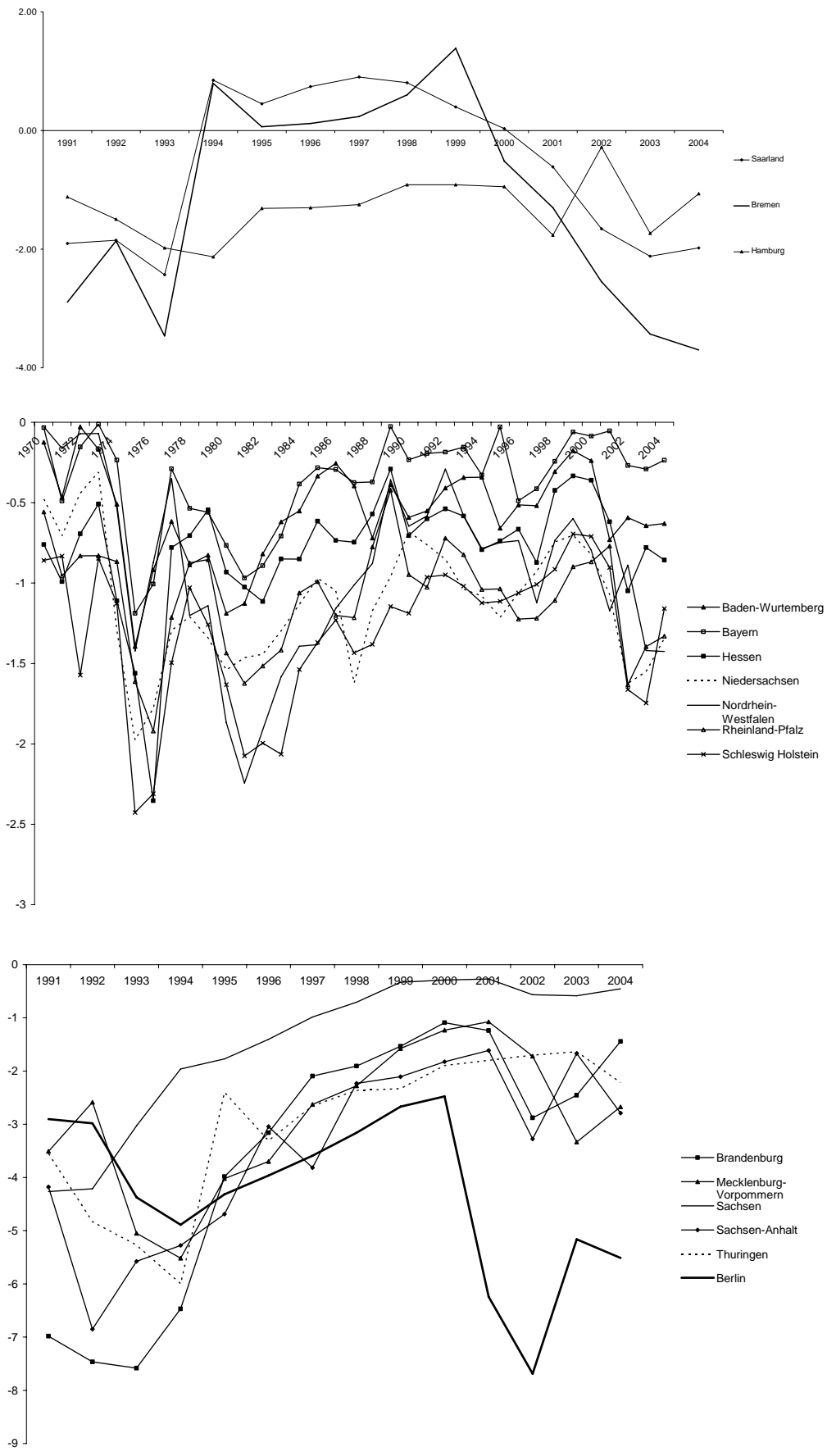Figure 2. German Länder: state surplus ratio (% of state GDP).

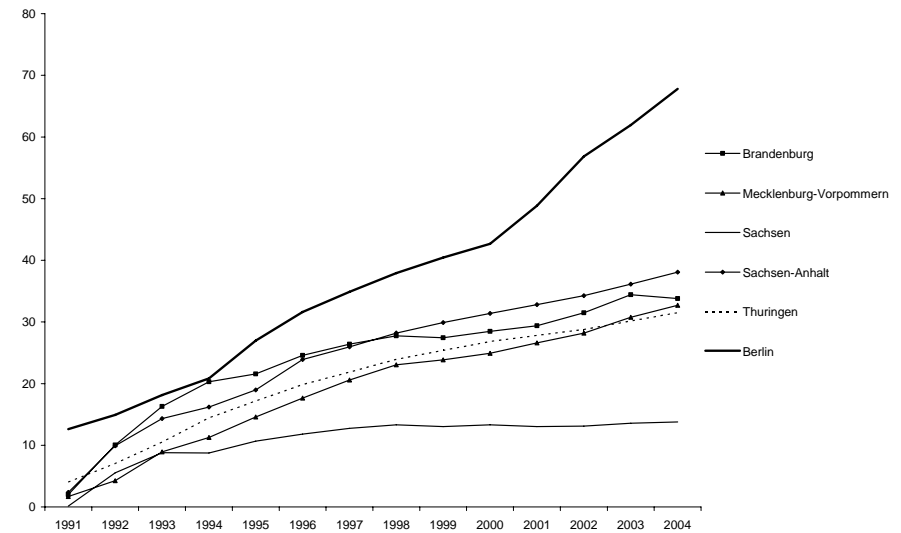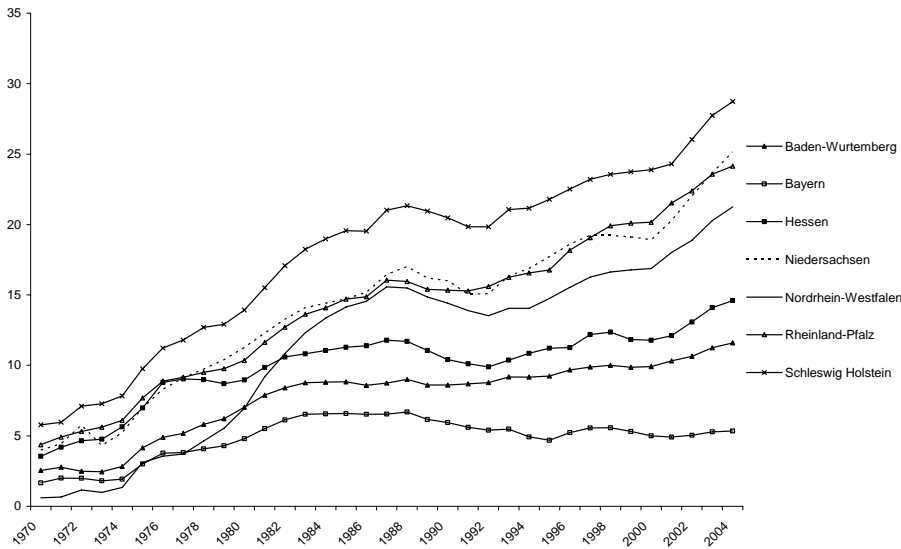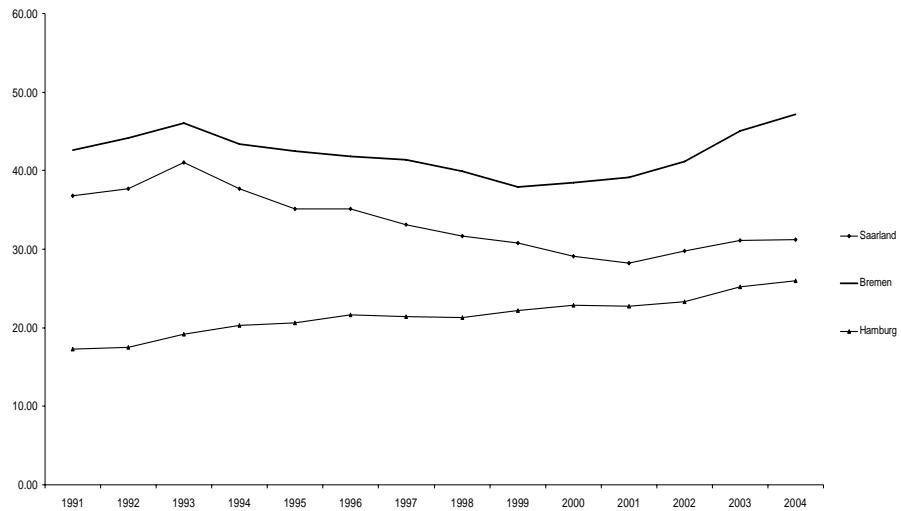Figure 3. State debt ratio for German Länder (% of state GDP).

Figure 4. IRF of liabilities: response to 1 s.d. shock to surplus, regional government.
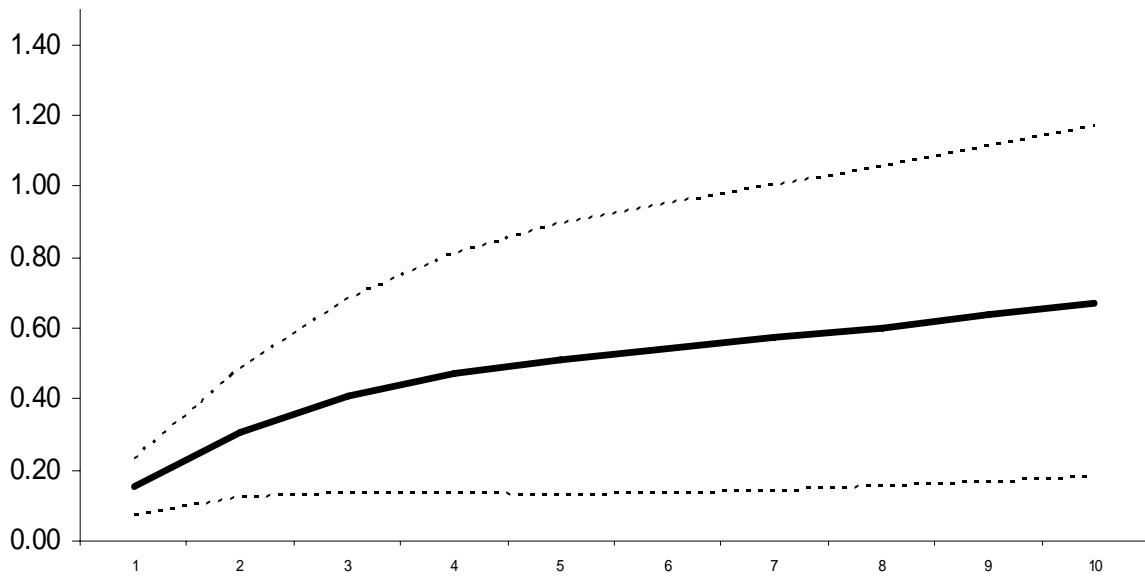

Figure 5. IRF of liabilities: response to 1 s.d. shock to surplus, federal government.
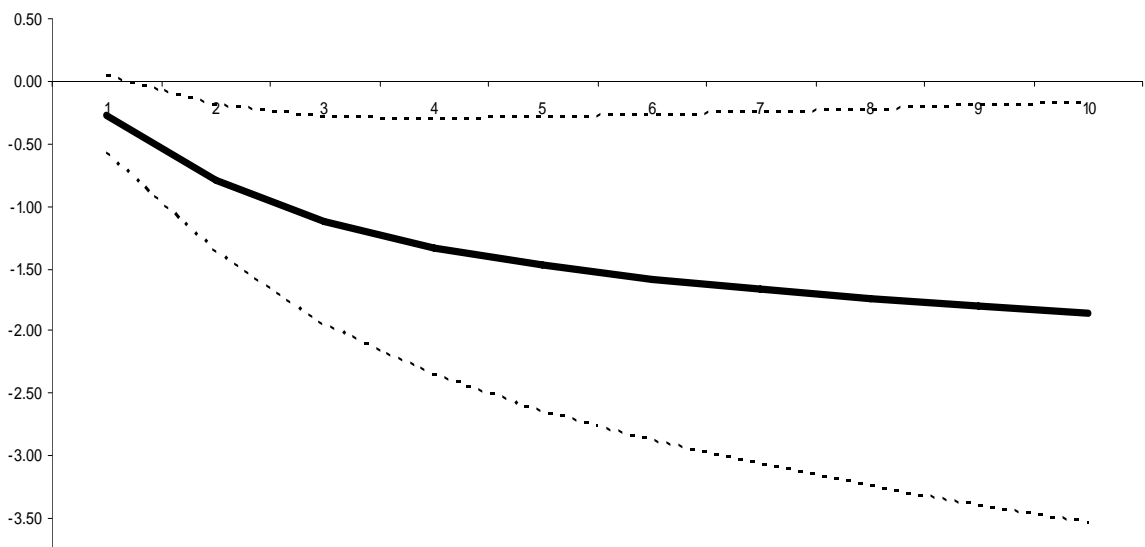
Figure 6. IRF of liabilities: response to 1 s.d. shock to surplus, general government.