

*And the Last shall be First:  
Federalism and Soft Budget Constraints in Germany*

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Based on dynamic game of incomplete information, this paper argues that subnational governments with bailout expectations face incentives to avoid or delay adjustment, and as a result accumulate greater debt than governments without such expectations. The problem of empirically identifying bailout expectations is assuaged by the unique German system of fiscal equalization, which insures roughly equal per capita revenues across states yet creates a clear distinction between states that are and are not eligible for future bailouts. Empirical analysis reveals that states with bailout expectations are less likely to respond to negative shocks, and controlling for a variety of macroeconomic and political factors, they run much larger deficits. The paper concludes with a discussion of implications of this intergovernmental moral hazard problem for fiscal management in Germany and beyond.

Tax hikes and expenditure cuts are politically costly, especially during recessions, and politicians with electoral motives will seek ways of minimizing these costs. If their time horizons are sufficiently short, they might simply refuse to adjust, over-borrowing and externalizing the political costs of adjustment to future administrations. In the long run, however, stabilization by sovereign central governments cannot be avoided altogether, since credit would eventually be unavailable at any price.

This paper examines a very different setting that often obtains among state- and local governments around the world. Stabilization might be avoidable even in the long run if other jurisdictions can be induced to pay the costs of adjustment. A subnational politician might rationally expect to avoid the political costs of adjustment if she believes that expenditures can eventually be shifted onto present or future residents of other jurisdictions. The intergovernmental moral hazard problem associated with budgeting in federations has recently received a good deal of scholarly attention (e.g. Wildasin 1997, Rodden, et al 2003), precipitated in part by recent episodes in which troubled subnational governments—most notably in Argentina and Brazil—over-borrowed and received large bailouts from higher-level governments, with grave consequences for macroeconomic stability. In addition, the bailout problem has been an important concern for designers of the institutions surrounding the European Monetary Union (von Hagen and Eichengreen 1996).

The problem arises when subnational politicians, along with their voters and creditors, perceive a positive probability of receiving a bailout from a higher-level government in the event of a future fiscal crisis. When a subnational jurisdiction is hit with a negative shock, bailout expectations dampen the incentives of budgeters to

undertake politically costly fiscal adjustment. If they perceive an implicit central government guarantee of subnational debt, credit markets will assess risk premia in accordance with the central government's creditworthiness, allowing for subnational debt accumulation that would lead to severe credit constraints in the case of a sovereign. Likewise, voters who perceive an implicit central guarantee will be more inclined to tolerate increasing debt burdens and less willing to tolerate expenditure cuts or tax increases. Thus the straightforward empirical hypothesis motivating this paper is that whether or not bailouts are eventually distributed, governments with rational bailout expectations are less responsive to negative shocks than governments without such expectations, leading to long-term differences in debt burdens.

A challenge for empirical research is that it is impossible to measure bailout expectations directly, and difficult to find an acceptable proxy. This paper makes use of the unique structure of German fiscal federalism, which creates rational bailout expectations among some *Länder* (federated states) but not others. An implicit federal guarantee of the debts of the recipient states in the German equalization system can be read into the German Basic Law, and credit markets have long interpreted the Law as providing a firm federal commitment to prevent defaults among the states. A series of decisions by the Constitutional Court has confirmed this interpretation, and indeed, two states—Bremen and Saarland—have received federal bailouts in response to “fiscal emergencies,” and a third state—Berlin—will likely soon join them.

In short, the states that pay into the equalization system have virtually no hope of being able to shift the costs of adjustment onto others. Thus they face incentives to respond quickly to negative shocks and maintain long-term balanced budgets. The

constitution and the history of intergovernmental transfers in the recipient states, however, have led politicians and their constituents to believe that expenditures will not be allowed to fall below the national average, regardless of a state's fiscal performance or debt levels—even if default looms. In practice, the relatively poor recipient states in the equalization system have grown accustomed to having similar or even larger revenues per capita at their disposal than the relatively wealthy states that pay into the system. The Länder have very little autonomous authority to increase their own revenue. Thus the recipient Länder have developed expectations that expenditures can always keep pace with the national average—indeed the constitution requires it—regardless of current revenues, and the share of public expenditures funded out of the common pool has been increasing steadily over time in these states. Given the presence of state-level borrowing autonomy and a mechanism through which the central government can distribute extra resources to troubled Länder—the so-called federal supplementary transfers—bailout expectations are quite rational among the recipient Länder.

This paper demonstrates that these divergent incentive structures lead to divergent fiscal behavior across Länder. The first section explains the problem of budgeting with bailout expectations as a dynamic game of incomplete information akin to the “soft budget constraint” problem associated with firms in socialist economies. The second section describes the basic incentive structure of German fiscal federalism and hypothesizes about the budgeting strategies selected by *Land* officials. The third section uses a new dataset containing state-level fiscal, political, and macroeconomic variables to examine long-term trends in deficits, and the fourth section focuses on short-term relationships, testing whether states with different expectations based on their position in

the transfer system respond differently to negative shocks.. This paper provides the first attempt in the literature at a comprehensive model of Land fiscal outcomes—a setting that is well-suited to test not only this paper’s argument about bailout expectations, but also a variety of other political-economic theories of government fiscal decisions.

The results suggest that states without hopes of future bailouts are fiscally conservative—they respond to unexpected revenue downturns by immediately cutting expenditures. In fact, they appear to have an aversion to borrowing during bad times—abiding by state-level constitutional “golden rules” stipulating that borrowing cannot exceed current expenditures. The states with rational bailout expectations, conversely, do not respond to negative revenue shocks, apparently unconstrained by their “golden rules.” As a result, the latter have developed much higher long-term deficits. The analysis also uncovers a Land-level electoral deficit cycle, as well as interesting effects of partisanship and political fragmentation. The final section draws out broad implications of the analysis and makes some cross-national comparisons.

## **I. The bailout game**

The literature on “soft budget constraints” among firms in socialist economies, which views the central government as falling prey to a dynamic commitment problem, is a good starting point for understanding the relationship between central and local governments.<sup>1</sup> The basic problem in this literature is that the government cannot commit not to extend further credit to a loss-making organization after providing initial

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<sup>1</sup> This literature was inspired by Kornai (1980); most of the formal literature flows from Dewatripont and Maskin (1995). For a literature review, see Kornai, Maskin, and Roland (2003).

financing, which creates bad incentives for managers when choosing projects. In the same way, the central government's inability to commit not to bail out local governments affects their incentives. Consider a simple game played between a central government (CG) and a single subnational government (SNG), both of whom are concerned with the expected electoral consequences of their fiscal policy decisions. A dynamic game of incomplete information is displayed in extensive form in Figure 1.<sup>2</sup>

[FIGURE 1 HERE]

Information is incomplete because subnational governments do not know the central government's type. That is, they do not know if, in the event of a future fiscal crisis at the final stage of the game, the central government will prefer to allow the subnational government to default (the resolute type) or will prefer a bailout (the irresolute type). The subnational government is faced with an adverse fiscal shock with lasting effects—for example a recession. In its first move after experiencing a negative shock, the subnational government may choose to adjust immediately and end the game, for which it receives EA—the payoff from early adjustment. Alternatively, it can refuse to adjust and deal with the shock by pursuing borrowing that may ultimately be unsustainable, hoping for an eventual bailout from the central government. The center must then decide whether it will quietly resolve the burgeoning problem by providing some additional funding to reduce the subnational government's growing debt burden. If it decides to do

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<sup>2</sup> The “bailout problem” has also been modeled as a sequential game driven by the central government's incentives by Wildasin (1997), who focuses on the structure of jurisdictions, and by Inman (2003), who considers a range of factors, including some of those discussed below. The approach in this paper, along with Bordinon and Turatti (2005), is distinct in that it focuses on incomplete information. In the spirit of Dewatripont and Maskin (1995), Qian and Roland (1998) use a sequential game to address the impact of devolution on incentives to provide bailouts, but their focus is on the budget constraints of state-owned enterprises rather than local governments themselves, and political considerations play no role. In their model, fiscal decentralization causes competition among local governments, which increases the opportunity costs of bailing out state-owned enterprises that have chosen bad projects.

so, the game ends with EB—the payoffs for “early bailout.” If it decides not to provide the bailout initially, a second stage ensues where the stakes are higher, a debt crisis has emerged, and default is imminent. Again the subnational government faces a choice between adjusting and attempting to externalize the costs of adjustment, although this time the bailout will be more expensive and explicit. Once again, the central government must decide whether to provide it.

The expected utilities of the subnational government are driven by the expected electoral values of each outcome. Subnational officials are concerned about the negative electoral consequences of adjustment, and would prefer that the costs of adjustment be paid by citizens of other jurisdictions. The subnational government prefers a quiet early bailout (EB), but if it cannot get a bailout at the first stage, it prefers to get one at the later stage (LB). If no bailout will be provided and the subnational government must pay the costs of adjustment itself, it would prefer a less costly early adjustment (EA) to a painful late adjustment (LA). The worst of all worlds is default without federal assistance (D). Thus the subnational government’s payoffs, common knowledge to everyone, are:

$$U_{\text{sng}}(\text{EB}) = 1 > U_{\text{sng}}(\text{LB}) > U_{\text{sng}}(\text{EA}) > U_{\text{sng}}(\text{LA}) > U_{\text{sng}}(\text{D}) = 0.$$

The central government’s preferences are less clear. All players know that the central government prefers for the subnational government to adjust by itself rather than run a large deficit and demand a bailout. The game is interesting, however, because the subnational government does not know the central government’s preferences as the game continues. The subnational government does not know with certainty whether it will be

more politically costly for the center to provide or deny a bailout. To capture uncertainty in the minds of the subnational officials, the game begins with a chance move that determines the central government's type—either resolute or irresolute. The central government is informed of its own type but the subnational government is not. The central government may try to announce its commitment up front, but the sub-central government knows that it may be cheap talk. If the central government is of the resolute type, it always prefers *not* to provide the bailout: The payoffs for a resolute and irresolute central government, respectively, are:

$$U_{\text{cgr}}(\text{EA}) = 1 > U_{\text{cgr}}(\text{LA}) > U_{\text{cgr}}(\text{D}) > U_{\text{cgr}}(\text{EB}) > U_{\text{cgr}}(\text{LB}) = 0.$$

$$U_{\text{cgi}}(\text{EA}) = 1 > U_{\text{cgi}}(\text{LA}) > U_{\text{cgi}}(\text{EB}) > U_{\text{cgi}}(\text{LB}) > U_{\text{cgi}}(\text{D}) = 0.$$

At each of its decision nodes, the subnational government does not know whether it is playing in the upper or lower branch of Figure 1, though it updates its beliefs about the center's type after observing the first round. The subnational government starts out believing that the center is resolute with probability  $p$ , irresolute with probability  $1-p$ . When it reaches its second information set,  $p$  has been updated to  $\bar{p}$ .

First, consider the equilibria under perfect information. By backwards induction, it is clear that if  $p=1$  (the subnational government believes with certainty that the center is resolute), the game ends quickly because the subnational government plays “adjust” in its first move, foreseeing that the center will play “no bailout” every step of the way, leaving the subnational government in the future with even less attractive options than

adjustment. If the center is known to be irresolute ( $p=0$ ), the subnational government will allow a fiscal crisis to develop by refusing to adjust, knowing that the center cannot tolerate a default. The game ends with an early bailout since the irresolute center can gain nothing by waiting.

The complete information equilibria provide a useful way to think about subnational fiscal sovereignty. At one end of a continuum, if  $p=1$  a subnational government is a miniature sovereign borrower. At the other end, where  $p=0$  the government is a non-sovereign. Yet when information is incomplete, the decisions of semi-sovereign subnational governments about whether to adjust are shaped in large part by their evolving assessments of the central government's resolve.

The perfect Bayesian equilibrium is discussed in detail in the appendix, but the key insights are easily summarized. First, there is no separating equilibrium in pure strategies. The subnational government—though it updates its beliefs after the first round—cannot surmise that an irresolute center always plays “early bailout” and a resolved center always plays “no bailout” in the first stage. Such a posterior belief for the subnational government is not consistent with the incentives of an irresolute center, which would take advantage of these beliefs by always masquerading as the resolute type in the first period, playing “no bailout” and inducing its preferred outcome, “late adjustment” by the subnational government.

This means, quite simply, that if  $p$  is sufficiently high initially, the subnational government might mistake an irresolute for a resolved center after observing “no bailout” in the first round. The subnational government knows it might be making this mistake, but the probability of running into a resolute center is perceived to be sufficiently high

that the subnational government prefers the fourth-best “late adjustment” payoff to prolonging the crisis and taking its chances by pressing further for bailouts. In this equilibrium, the subnational government has essentially tested the resolve of the center and backed down. It was sufficiently uncertain about the center’s resolve that it was willing to avoid adjustment and borrow heavily at first, but after the center has done nothing and default emerges as a realistic possibility, the subnational government chooses to back down. Of course the game can also end in “late adjustment” if a resolved center plays “no bailout” and the subnational government wisely backs down.

Other things equal, lower initial values of  $p$  increase the likelihood that subnational governments will avoid adjustment in the first round. The appendix establishes a critical value for  $p$ , below which it makes sense for a rational subnational government to push for bailouts in the first round. As these “resolve testing” equilibria demonstrate, this does not mean that bailouts will ultimately be received, nor does it mean that the subnational government will experience disastrous defaults. Irresolute central governments might use the intergovernmental transfer system to relieve debt burdens of subnational governments well before full-blown fiscal crises develop. Subnational governments might position themselves for such transfers but ultimately give up before the debt-servicing crisis emerges. A dramatic last-minute bailout on the eve of default only happens when an irresolute center attempted to masquerade as resolute and the subnational government called its bluff. A dramatic default without a bailout should only happen when the subnational government misperceives the center’s type.

As a guide to empirical research, the model suggests that manifestations of bailout expectations among subnational governments are not limited to dramatic defaults or last-

minute bailouts under pressure from creditors, but in many plausible scenarios imply more routine early bailouts such as gap-filling intergovernmental transfers or delayed adjustment. The simplest empirical implication of this model is that if one can identify institutional, demographic, or other factors that are associated with high values of  $p$ , one should expect to find that subnational governments adjust to external shocks and maintain long-term fiscal balance on their own. If institutional and political arrangements suggest sufficiently low values of  $p$ , one should expect a greater willingness of subnational governments to avoid or delay adjustment, resulting in larger and more persistent deficits.

## **II. Fiscal federalism and rational bailout expectations in Germany**

As in the empirical literature on soft budget constraints among firms, it is difficult to estimate the impact of bailout expectations on behavior because of the difficulty of measuring expectations. Absent suitable survey research, one must search for indirect proxies. For instance, Rodden (2005) contrasts bond ratings of provincial governments with similar debt burdens and other characteristics in different federations to infer that bailout expectations derived from the intergovernmental transfer system are built into the otherwise inexplicably higher ratings of, for example, the autonomous community of Madrid or the state of Western Australia relative to the state of New York. In order to estimate the impact of bailout expectations on fiscal behavior, however, it is preferable to contrast local governments within the same country by exploiting some exogenous source of cross-section or time-series variation in bailout expectations. The endogeneity problem is substantial, however: past fiscal decisions often drive present eligibility for

bailouts, and it is likely that any proxy for bailout expectations is driven by factors like asymmetric regional macroeconomic shocks, natural disasters, or changes in the nature of the intergovernmental transfer system that also affect borrowing decisions. One approach, taken by Pettersson-Lindbom and Dahlberg (2003), is to assume that bailout expectations are driven primarily by past play, and instrument for bailout expectations by using lagged bailouts. But as emphasized in the model above, bailout expectations can affect fiscal behavior in the absence of actual bailouts. Another approach, taken by Bordignon and Turati (2005) in a paper exploiting changes over time in the decentralization of public health finance in Italy, is to find a natural experiment.

The German system of fiscal federalism offers a quasi-experimental opportunity since it divides the states into those with and without bailout expectations according to whether they pay into or receive equalization transfers. A state's position in the equalization system is not subject to discretion, and thus cannot be driven by past expenditures or borrowing. And while recipient states are of course relatively poor, it is difficult to attribute relatively lax fiscal management solely to unmeasured omitted variables causing fiscal distress since these states have, on average, more revenue per capita at their disposal than their wealthier counterparts.

The Länder are responsible for almost 40 percent of public expenditures, though they possess miniscule autonomous taxing authority. The vast majority of their revenues come from shared taxes and intergovernmental grants. The Länder are the largest public sector employers in Germany and are responsible for providing most national collective goods that are legislated at the federal level, where they are important veto players through their direct representation in the powerful upper legislative chamber. They have

full autonomy over how much to spend and borrow each year, but very little control over revenue levels, which are determined by the allocation of predictable, formulaic shared revenues and grants. As a result of a bargain struck in the aftermath of World War II, the fiscal constitution requires that each Land be able to provide public services that create “equivalent living conditions” throughout the federation. To that end, the equalization system goes to great lengths to even the expenditure capacities of the Länder through a three-stage process.<sup>3</sup> During the period under analysis in this paper, the equalization system works as follows: In the first stage, up to 25 percent of the value added tax is redistributed to the Länder with the lowest revenue after the primary tax sharing receipts are calculated. Revenue is then redistributed from states whose “endowments” exceed their “needs” (based on national per capita tax income), bringing the relatively poor states up to 95 percent of their financial “needs.” In the third stage of equalization, the federal government steps in to lift the recipient states up to at least 99.5 percent of the national average with so-called supplementary grants. By the end of the equalization process, the recipient states end up with similar per capita revenues at their disposal. Moreover, there are a variety of other specific-purpose grant programs, some of which are targeted at relatively poor states, so that all told, yearly per capita revenues are actually higher in the relatively poor states on the receiving end of the equalization system than in the wealthier, paying states.

During the period from 1974 to 1993, Baden-Württemberg, Hessen, and Hamburg have consistently paid into the equalization system and have not qualified for supplementary transfers at the final stage of equalization. Nordrhein-Westfalen paid into

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<sup>3</sup> For more details, see Spahn and Föttinger 1997, Renzsch 1991.

the system every year except for four years in the mid-1980s when it was neutral. Bayern was a recipient until 1986, but since the mid 1970s its receipts have been negligible. During the same period, Bremen, Niedersachsen, Rheinland-Pfalz, Saarland, and Schleswig-Holstein have been consistent recipients in the equalization scheme. Since unified Berlin and the five new Länder were incorporated into the equalization system in 1995, they have become the largest recipients, Nordrhein-Westfalen has become a more substantial contributor, and Niedersachsen, Rheinland-Pfalz, and Schleswig-Holstein have inched closer to neutrality.

The central government has no power to veto or place numeric restrictions on the borrowing activities of the Länder. Like the federal government, however, the Länder have their own constitutional and statutory provisions that restrict them from borrowing more than the outlays for investment purposes projected in the budget. These so-called golden rule provisions at the Land level, however, have a number of well-known loopholes. "Investment purposes" is a slippery concept, and it is easy to recast a variety of expenditures as investment outlays. Moreover, since 1969 the constitutions of the Länder allow them to break the golden rules in cases of "disturbances of general economic equilibrium." In any case, Bremen and Saarland simply ignored the constitutional provisions, even using the unconstitutionality of their deficits in pressing the federal courts to release bailout funds.<sup>4</sup>

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<sup>4</sup> According to the data collected by the central government on the finances of the Länder and author's calculations, prior to 1995 deficits have surpassed capital expenditures quite regularly in Bremen and Saarland, and only sporadically in Hamburg and Niedersachsen. *On paper ex post*, the other Länder have abided by the "golden rule." However, these numbers should be taken with a grain of salt if the division between capital and current accounts is as fluid as most observers suggest.

The Länder rely primarily on direct bank loans to finance their deficits, especially from the network of commercial banks (the *Landesbanken*) that they indirectly control.<sup>5</sup> In recent years, some Länder have started issuing bonds, and their treatment by ratings agencies is telling. Creditors believe that the “equivalent living conditions” clause and the equalization system imply a rather straightforward federal guarantee of subnational debt. Fitch-Ibca is so confident in the federal government’s implicit guarantee that it assigns the federal government’s AAA rating to each of the 16 Länder—even bankrupt Berlin. Standard & Poor’s rates only 8 of the Länder, three of which receive AAA ratings, and on average the Länder are more highly rated than the U.S. states and Canadian provinces in spite of much higher debt burdens. Unlike Fitch, Standard & Poor’s differentiates between the credit quality of the Länder primarily out of concern over the speed with which bailouts would be administered in the event of a debt servicing crisis.

It is likely that state governments on the receiving side in the equalization system, along with their voters, form similar impressions. Budgeters in the recipient Länder make fiscal decisions with the knowledge that  $p$  in the model above is quite high, and though a bailout may be a distant prospect, defaults will not be tolerated. Moreover, recent events suggest that the courts will require federal bailouts well before default looms. In the 1970s and early 80s, bailout expectations among the recipient states were quite rational but had not yet been confirmed. Betting on a sufficiently high bailout probability, Bremen and Saarland avoided expenditure cuts throughout the 1980s. Beginning in 1987, they started to receive additional supplementary transfers explicitly

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<sup>5</sup> The officials of the Landesbanks generally have strong political connections with Land politicians, who frequently accept lucrative stints on their Landesbank’s supervisory board.

aimed at coping with high public debt. Their expenditures only accelerated, and their burgeoning debt crises intensified. They pushed the bailout game to the final decision node and pursued their bailout demands court. Bailout expectations were ultimately confirmed explicitly in 1992 when the Federal Constitutional Court handed down its decision stipulating that the constitution required the Bund to make additional payments to Bremen and Saarland amounting to around 30 billion DM over the period from 1994-2000 by adding to their supplementary transfers in order to reduce public debt without severe expenditure cuts (Seitz 1998). The text of the decision is now being used by Berlin in its current petition before the courts for a similar bailout. The decision clarified that an *emergency* exists in a Land if the deficit/expenditure ratio and interest payment/tax ratios are more than twice the Land average. If a Land government can prove that it has made serious efforts at fiscal consolidation on its own, it can trigger a bailout by declaring an *extreme emergency* if it can also prove that the normal mechanism of equalization is insufficient to reduce the debt burden without threatening the norm of equivalent service provision. The interpretation of bailout eligibility lies solely in the hands of the courts.

This 1992 decision clarified what was already implicit: the credibility of the central government's "no bailout" commitment is driven by a state's place in the equalization system. Only recipient states that qualify for supplementary transfers at the final stage of equalization can hope for bailouts. For the states that pay into the system—most notably Baden-Württemberg and Hessen and now Nordrhein-Westfalen and Bayern as well—*p* in the bailout game is close to zero. The interpretation of the Basic Law is that bailouts would only be possible in the event of years of economic decline

transforming the states into recipients accompanied by debt buildup with interest payments crowding out other politically popular expenditures.

The states on the receiving end of the equalization system make a very different assessment of the center's credibility. Even if not currently preparing to declare an extreme emergency (this surely entails political costs) the recipient states understand that eventually they or a future government will have that option. Income from enhanced fiscal assistance in the future (multiplied by some probability) is taken into account when making current fiscal decisions.<sup>6</sup> This makes them more comfortable with a higher debt burden and less willing to undertake politically painful expenditure cuts in response to negative shocks.

### **III. Equalization and deficits**

In order to assess the relationship between bailout expectations and fiscal behavior, yearly data on Land-level total revenue, expenditures, deficits, equalization payments, unemployment, GDP, and a variety of political control variables have been collected for the period from 1974 to 2003. GDP and fiscal variables are expressed in 1995 Euros per capita based on Land-specific deflators.<sup>7</sup> There is substantial

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<sup>6</sup> The literature on consumption provides some useful analogs. Starting with similar income and debt burdens, and faced with a similar negative shock, a law student will be more willing to smooth consumption through borrowing than an art student because the former expects higher income in the future. Smoother expenditures and higher debt burdens will also be more attractive to individuals with aged, wealthy parents even if the contents of the will are unknown.

<sup>7</sup> Fiscal and unemployment data have been obtained from the German *Statistisches Bundesamt* at <http://www.statistik-bund.de> and the *Statistisches Jahrbuch für die Bundesrepublik Deutschland*. Land-level GDP data and deflators were kindly provided by the Baden-Württemberg Ministry of Finance. All political variables were created using information obtained from <http://www.aicgs.org/wahlen/>; <http://www.election.de/lw.html>; <http://www.bundeswahlleiter.de/wahlen/>; and for the most recent years, web pages of state governments.

discontinuity in the time series in the mid-1990s. First, the revenues of Bremen and Saarland jumped dramatically in 1994 when they began receiving bailouts. Second, the five new eastern Länder and the reunified Berlin joined the equalization system in 1995. The approach taken here is to examine the ten states of the old West German federation up to 1993 (excluding West Berlin, which had its own separate system of public finance), and pursue separate analysis of the shorter time series for all 16 states from 1995 to 2003.

[FIGURE 2 HERE]

The simplest but perhaps least convincing evidence of stronger bailout expectations among the recipient Länder is the long-term correlation between fiscal equalization and deficits. Figures 2a and 2b are scatter plots of average real deficits per capita and average equalization receipts (payments) per capita before and after unification, both suggesting a linear relationship. In fact, simple between-effects regressions on cross-section averages including macroeconomic and political controls reveal significant negative coefficients both before and after unification, though of course statistical significance is sensitive to excluding influential cases. In order to make fuller use of the dataset, the remainder of this section presents time-series cross-section analysis for both periods, though given the small number of year observations (9) since unification, the most important results are for the “old” Länder before 1994. Since tests revealed that deficits in levels are non-stationary for some states, the dependent variable is first-differenced. Yet since the goal is to examine longer-term effects of bailout expectations associated with the equalization system, an error correction model is attractive, including both first differences and lags of the independent macroeconomic

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and fiscal variables, with the first differences capturing the effects of short-term fluctuations, and the key long-term relationship estimated by the coefficient on the lagged equalization variable.

Lags and first differences of GDP per capita and unemployment rates are included as controls, along with the following political variables: First, in order to control for the possibility of electoral budget cycles, a variable for state election years is included (each state has its own electoral cycle).<sup>8</sup> Second, to control for the ideological composition of state governments (e.g. Hibbs 1977) and the possibility that fiscal behavior is affected by political fragmentation owing to conflicts of interest among veto players (e.g. Roubini and Sachs 1989, Alesina and Drazen 1998), I include a matrix of dummy variables for the various political configurations of state governments: CDU alone, SPD alone, and coalitions of CDU-FDP, CDU-SPD, SPD-Green, and in the post-unification period, SPD-PDS. The omitted category is the rare SPD-FDP coalition.<sup>9</sup> Alternative specifications, not presented but briefly discussed below, attempt to distinguish between the effects of party platforms and political fragmentation by conceptualizing the ideology of state governments based on an expert survey conducted by Huber and Inglehart (1995), and fragmentation as either the number of veto players or the ideological distance between them.<sup>10</sup> Finally, I have included a dummy variable indicating whether the governing

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<sup>8</sup> I define an election campaign as the six-month period before the election. If an election takes place in July or later, the observation receives a 1. If the election takes place in June or earlier, the year receives a .5, as does the preceding year.

<sup>9</sup> Previous work on Land fiscal outcomes is limited to Wagschal (1996), who examined the bivariate correlation between long-term average Land party control and debt, finding that left-wing governments accumulated more debt, and Seitz (2000), who found that partisanship does not affect the response of fiscal variables to the business cycle.

<sup>10</sup> Huber and Inglehart (1995) draw on surveys of political scientists, sociologists, and survey researchers who are asked to place parties on a 10 point scale from left to right, reporting the following mean positions for German parties: Greens 2.91, SPD 3.83, FDP 5.64, CDU 6.42, and CSU 7.3. The ideology variable is the average of the scores for the coalition members. One measure of fragmentation is simply the number of

party (or senior coalition partner) in the Land shares the partisan orientation of the party in power at the federal level. One possibility is that if the center's co-partisans expect extra discretionary resources, they might adopt looser fiscal management. On the other hand, if parties are vertically integrated and fiscal discipline is an important issue in national elections, co-partisans of the center might face increased pressure to balance budgets (Rodden 2005).

Given the likelihood of important unmeasured cross-state heterogeneity, a fixed-effects model is most appropriate. But since much of the interesting variation in bailout expectations, proxied by the state's position in the equalization system, is across states rather than over time, results of random effects models are presented as well. Note that for the post-unification regressions, the years up to 2000 were omitted for Bremen and Saarland since they were running surpluses funded by court-ordered bailouts under a form of federal receivership during these years. The results presented in Table 1 display panel-corrected standard errors.

[TABLE 1 HERE]

The results are presented in Table 1. In the pre-unification period, other things equal, both in the short-term and long-term, deficits expand as states become larger recipients in the equalization system. The coefficient for lagged equalization is quite similar whether fixed effects are included or not: a one percent increase in equalization receipts per capita is associated with an increase in the deficit between .20 and .23 percent (deficits are negative). This result is not unduly influenced by any influential

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parties in the coalition. An alternative variable is the absolute value of the distance between the Huber-Inglehart scores of the coalition members (ranging from zero for one-party government to 2.59 for a grand coalition of the CDU and SPD). For all three variables, election years are averages of the scores of the pre- and post-election coalitions, weighted by the number of months in the tenure of each.

cases, nor does it change with alternative estimation techniques<sup>11</sup> or other ways of measuring the independent variable (relative shares of total equalization or equalization as a share of revenue rather than real equalization per capita). For the post-unification period the coefficient is indistinguishable from zero in the fixed effects model, which is not surprising given that there are only 9 year observations and 16 states. It is significant, though substantively smaller, in the post-unification model without fixed effects. Thus when cross-state variation is allowed to affect the results, equalization receipts are correlated with deficits in more recent years as well.

Some of the control variables are also worthy of discussion. First, there is clear evidence of a Land-level electoral budget cycle that has not previously been identified in the literature. Elections years are associated with a 3-4 percent spike in deficits in the pre-unification period, and an 8-9 percent spike in the more recent period. Moreover, different political parties display different fiscal behavior. Especially in the post-unification period, governments composed exclusively of the CDU or CSU demonstrate smaller deficits, whereas in the pre-unification period, an SPD absolute majority and an SPD-led coalition with the Greens are both clearly associated with larger deficits. Land officials of the CDU, which often runs on a platform of fiscal restraint and smaller government, may attempt to signal their competence to voters or higher-level party leaders by running balanced budgets. Manfred Schmidt (1992: 58) presents survey evidence that CDU voters expect more conservative fiscal policy than SPD supporters. Since the SPD is a party with campaign platforms emphasizing larger, more activist

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<sup>11</sup> The results are virtually identical using OLS with robust standard errors, and are not affected by the inclusion of a matrix of year dummies. One potential source of bias in model 1 is the inclusion of a lagged dependent variable with fixed effects. One alternative is the Arellano-Bond GMM estimator, which is not well suited to capture long-term effects. This approach yields a coefficient of -.12 for the equalization

government than the CDU, but the Land governments have virtually no tax authority with which to fund new projects, deficits are the only way of expanding expenditures. An interesting further result is that in the pre-unification period, “grand coalitions” of the CDU and SPD are associated with smaller deficits.<sup>12</sup> Finally, states run by co-partisans of the federal government run significantly larger deficits than states run by the party in opposition at the federal level.

The key result is that controlling for fluctuations and long-term trends in state income and unemployment, states on the receiving end of the equalization system run substantially larger deficits, and states run larger deficits as they move along the spectrum from payers to recipients. Yet absent a good instrument for a state’s place in the equalization system, the causal story about bailout expectations is not the only plausible explanation. Industrial decline, shifting terms of trade, or other long-term factors not adequately captured by state GDP and unemployment might reduce a state’s tax collection, thus pushing it further into recipient status while placing additional expenditure pressure on the state government. The next section seeks to mitigate that problem by focusing exclusively on short-term adjustments to unanticipated revenue shocks in the presence of “golden rules.”

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variable ( $p=.02$ ). Another alternative is to drop the lagged dependent variable and apply the Prais-Winsten transformation. This approach yields a coefficient of  $-.12$  ( $p=.01$ ) for the lagged equalization variable.

<sup>12</sup> An alternative approach is to replace the matrix of partisan variables with the continuous “ideology” variable described above, or a simple dummy for SPD-led governments, and a variable capturing either the number of coalition members or the distance between them. In these models as well, left-wing governments clearly run larger deficits, especially in the pre-unification period. Both fragmentation measures are actually associated with *smaller* deficits in the pre-unification period, but as the results displayed here suggest, this is driven by the fiscally conservative grand coalitions. In the post-unification period, coalition governments run slightly larger deficits than single-party governments, but the ideological distance between the veto players has no impact. Furthermore, in order to assess arguments that partisanship and political fragmentation affect the speed of adjustment (rather than simply expenditure levels), these variables have also been interacted with lagged deficit levels in these models and the “revenue shock” variables discussed in the next section, but the results do not approach statistical significance in any estimation.

#### **IV. Fiscal adjustment with bailout expectations**

The federal and state constitutions envision a system, consistent with basic principles of fiscal federalism, in which the federal government is responsible for Keynesian macroeconomic management and tax smoothing, while the Länder—though free to undertake limited borrowing for investment projects—avoid such activities, steadfastly setting yearly expenditures equal to revenues. Given the complete leveling of revenues each year, the poorest states should be as capable of adjustment as the wealthiest states. Yet the political unpopularity of restraining expenditure growth during periods of slow revenue growth makes it tempting to manipulate the porous boundary between capital and current expenditure and borrow in order to keep expenditure growth constant. This temptation should be especially strong among the states that qualify for the supplementary transfers through which bailouts may be distributed.

The equalization system is not designed to provide full insurance against regional downturns, and does not do so in practice. By simply bringing the relatively poor Länder up to the average fiscal capacity of the federation each year, the equalization system does not insure that regional downturns will trigger tax breaks or increased revenues in Länder that are affected by downturns (see Von Hagen and Hepp 2000). Rather, Land revenues are procyclical. Thus the equalization system does not remove or even substantially reduce the politically painful necessity of adjusting to downturns, yet it encourages some states to believe those costs can be externalized in the future.

Unlike federations such as the United States and Canada where the constituent units possess wide-ranging tax autonomy, state income or other macroeconomic aggregates are not necessarily the best way to measure shocks in Germany. While it would be inappropriate in most other multi-tiered fiscal systems, in Germany state revenues can be viewed as exogenous. Receipts from autonomous Land taxes and fees are minimal, and yearly revenue levels are products of the equalization system. Land tax collection authorities may vary in their revenue efforts across time and space, but due to the leveling impact of the equalization system, these efforts have minimal impact on a state's disposable revenue. Thus this section contrasts the Länder according to their expenditure responses to exogenous revenue shocks.

The literature suggests two ways to distinguish empirically between expected and unexpected components of revenue. Poterba (1994) and Rattsø (2004) compare actual values with budget forecasts, and view the residual as the "unexpected shock." This requires a reasonable time-series of subnational budgets, which is unavailable for the German Länder. An alternative method is to estimate yearly "expected" values based on trends, and view the differences between expected and actual values as "shocks" (Holtz-Eakin and Rosen 1993, Rattsø 1999).

In order to focus on short-term adjustment within states, the (stationary) dependent variable is the first difference of the log of real per capita expenditure. The estimations presented in Table 2 also include a lagged first difference of logged real per capita expenditures. "Revenue shocks" are defined as the difference between real revenue per capita and predicted values from an autoregressive model, taken as a percent of the "expected" value. This variable is decomposed into positive and negative shocks,

such that positive shocks take on the value zero for years in which revenue is below expectation, and vice versa.

These positive and negative shock variables are then interacted with a variable that captures the state's relative position in the equalization system. The discussion above suggested three groups of states in the pre-unification period: the anchors that subsidized the equalization system (Baden-Württemberg and Hessen), the essentially neutral states that never qualified for substantial supplementary transfers (Nordrhein-Westfalen, Bayern, and Hamburg), and the consistent recipient states with heavy dependence on supplementary transfers (Bremen, Saarland, Niedersachsen, Rheinland-Pfalz, and Schleswig-Holstein). These are coded 0, 1, and 2 respectively, and this trichotomous variable is interacted with the shock variables in models 5 and 7 of Table 2 for the pre- and post-unification periods respectively. A second approach is to treat bailout expectations as continuous and possibly changing over time within states—most rational among the clearest recipients and least rational among the largest payers. Accordingly, models 6 and 8 interact the “shock” variables with the log of a state's yearly real equalization receipts/payments. Models 7 and 8 should be approached with a good deal of skepticism since the results of interest are based on a rather small number of negative shocks.

As above, the models also include first differences and lags of real state GDP per capita and the state unemployment rate, along with the political control variables. The lagged deficit is included as well. All of the models in this section include Land fixed effects. I do not include year dummies since it is clear that the most important negative

shocks to the finances of the Länder are symmetric ones associated with nationwide downturns, though all the results are quite similar if year dummies are included.

[TABLE 2 HERE]

First consider the pre-unification results in models 5 and 6. Positive revenue shocks do not have a statistically significant impact on expenditures, but the negative revenue shock variable and the interaction term are highly significant and substantively interesting. The conditional coefficient for the large paying states when the trichotomous variable takes on zero is .83, implying that a 1 percent negative revenue shock is met with a .8 percent decrease in expenditures. The conditional coefficient for the neutral states is .44 and statistically significant, while that for the recipient states is .06 and indistinguishable from zero. Model 6, using the continuous interaction term, allows for a visualization of the contingent relationship over the full range of values in the data set.

[FIGURE 3 HERE]

Figure Three plots the sample range for the log of the real per capita equalization variable on the horizontal axis, indicating the range of values for each state in the pre-unification period, and the associated conditional coefficients on the horizontal axis. The bold line plots the conditional coefficients, and the lighter lines indicate the 95 percent confidence interval. Like Model 5, it shows coefficients around 1 for the states that pay into the system, decreasing to around .5 for the neutral states. Again, for the states on the receiving side of the equalization system, the coefficient is statistically indistinguishable from zero. In fact, for the states with the most rational bailout expectations, the negative coefficient even approaches statistical significance, indicating that if anything, Bremen and Saarland have increased expenditures in response to negative revenue shocks.

These coefficients indicate that the paying states, without rational hopes of qualifying for supplementary bailout grants, abide by the fiscally conservative logic implied by the “golden rule” system. When faced with unexpected revenue shocks, expenditures are cut accordingly immediately, with no smoothing role for borrowing. On the other hand, among the states with the most rational bailout expectations, the golden rule logic is ignored, and in the face of negative revenue shocks, expenditures continue on their current path or even increase.<sup>13</sup>

Models 7 and 8 should be approached with caution due to the short time series and rather extraordinary challenges associated with unification. In model 7, Bayern, Hamburg, and NRW join Baden-Württemberg and Hessen as major payers, while Schleswig-Holstein, Niedersachsen, and Rheinland-Pfalz have become neutral—no longer qualifying for major supplementary transfers—and Saarland, Bremen, Berlin, and the five new eastern Länder potentially qualify for future bailouts. Though not always individually significant, the negative shock variables and interaction term are jointly significant, with a similar interpretation, though in this instance the coefficients are positive and significant throughout the sample range. The conditional coefficient for the paying states is .76, that for the neutral states is .53, and that for the recipient states is .30. In model 8, the interaction term and its components are jointly (though not individually) significant, and a plot of conditional coefficients looks rather similar to Figure 3, though

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<sup>13</sup> I have also experimented with a variety of different ways of estimating “expected” revenues and “shocks” with similar results. One approach is to use state and federal income growth to predict expected revenues. Another approach is to use the Hodrick-Prescott smoothing filter to create a smooth series of “expected” revenues, with deviations from trend viewed as “shocks.” In a similar way, the dependent variable can be measured as deviations from trend expenditures. This type of model yields very similar elasticities to those presented in Table 2.

the slope is less severe and the conditional coefficients are all positive and significant, ranging from .3 to around .7.

The control variables shed further light on the discussion above. First, expenditures are higher during Land election years. Second, in the pre-unification period, grand coalitions were more likely to constrain expenditure growth. Third, Model 6 suggests that SPD governments are higher spenders. This result comes through more clearly if fixed effects are left out. When the matrix of partisan variables is replaced with the expert survey based ideology measure or a simple dummy for SPD-led governments in models without fixed effects, it is clear that left-wing governments spend more during the pre-unification period, though no such relationship is identified in the post-unification period. Model 6 suggests that co-partisans of the central government do less to constrain expenditure growth, though the result is not very robust in alternative specifications.

## **V. Discussion and conclusions**

The fiscal implications of soft budget constraints are difficult to address empirically because bailout expectations are difficult to measure and often endogenous, while a suitable instrument is extremely difficult to find. The unique German fiscal constitution and its interpretation by the courts have created a relatively clear distinction between states that can rationally believe they will qualify for future bailouts and those that cannot. Furthermore, the rather extreme redistribution undertaken in the German federation creates a situation in which the last are first—the poorest states end up with the largest per capita revenues each year, and arguably should be as capable of absorbing

shocks and balancing their budgets as their richer counterparts. This paper has shown that controlling for macroeconomic and political conditions, the states with the strongest bailout expectations run much larger deficits than their peers, and the ossification of bailout expectations within states over time is associated with larger deficits. This is in large part because the states with more rational bailout expectations are less inclined to undertake politically painful expenditure cuts in response to negative revenue shocks.

While the German system presents a useful design to aid in identifying the fiscal implications of bailout expectations, the endogeneity problem has not been vanquished completely. After all, a finance minister from a recipient state would likely argue that larger deficits and slower adjustment are caused by especially difficult and unique unmeasured circumstances rather than bailout expectations. This possibility cannot be ruled out, though the models presented above control for trends in state income and unemployment, and the very weak expenditure responses to negative revenue shocks among recipient states are difficult to explain without bailout expectations.

No matter how one interprets the data, the moral hazard problem among the states qualifying for supplementary transfers looms large in German public finance. In fact, the explosive growth of Land debts since the 1980s, and especially since unification, is perhaps the most important reason why Germany has run afoul of the excessive deficit procedure under the EMU Growth and Stability Pact. The federal government falls prey to a moral hazard problem that allows some states with bailout expectations to access credit markets and even their own banks without federal oversight.<sup>14</sup> In this regard some of Germany's states resemble the provinces and states of Argentina and Brazil in the late

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<sup>14</sup> The equalization system also provides the tax collection agencies of the Länder with very weak incentives to combat evasion and enhance collection efforts, which reduces the size of the revenue pool.

1980s and early 1990s. The recent history of the city-state of Berlin, which is currently pushing the bailout game to the final stage, brings to mind São Paulo's behavior in the 1990s. Given its constitutional responsibilities and the rather unusual role of the courts, the German central government cannot make a credible "no bailout" commitment. Yet because the recipient states constitute formidable blocking coalitions in the legislature—especially in the upper chamber and even more so since unification—the central government remains powerless to implement reforms aimed at the privatization of the Landesbanks or enhanced regulation of expenditures or borrowing by the Länder (Beramendi 2003, Rodden 2005).

This paper also raises some new questions that are amenable to further research. Above all, the strict fiscal discipline of the paying states is perhaps somewhat startling. Given that they have the ability to circumvent their golden rules and borrow to smooth negative revenue shocks, it is surprising that they respond to negative shocks so quickly and decisively with corresponding expenditure cuts. One possibility is that debt accumulation among wealthy states would be perceived as a signal of incompetence to voters. Alternatively, saving during good times might be politically difficult, which constrains a regional government's flexibility to borrow during bad times. In any case, the lack of significant smoothing over the business cycle among local governments that would appear to have access to credit markets is a puzzle left unexplained in other countries as well (e.g. Holtz-Eakin, Rosen and Tilly 1994, Rattsø 2004).

Some of the political control variables yielded interesting results that may be worthy of further exploration. Expenditures and deficits expand during election years, and Länder controlled by the Social Democrats spend more and run larger deficits than

those controlled by the Christian Democrats. While there is no consistent effect of coalition government on budget balance, grand coalitions of the two major parties—which are often justified with non-ideological appeals to “good government”—are associated with reduced expenditures and smaller deficits. Moreover, consistent with an empirical analysis of the Indian states by Khemani (2002), in the pre-unification period, states controlled by the party in power in Bonn had a tendency to spend more and run larger deficits than those controlled by the federal opposition party.

Finally, the model and empirical analysis in this paper point to a new direction in the empirical analysis of subnational fiscal behavior. The literature on the United States assumes—perhaps correctly for the states—that subnational governments are essentially sovereign over their own finances. Such assumptions are probably appropriate for the Canadian Provinces and Swiss Cantons as well. For a variety of reasons owing to history and institutional design, voters and creditors understand that future bailouts are unlikely, and individual subnational governments alone are responsible for their obligations. There is also a literature on unitary systems, where subnational governments are more likely to be viewed by creditors and voters as creatures of the central government, and the center’s lack of commitment is common knowledge. In these systems, strict central regulations generally keep the moral hazard problem at bay. Yet this paper addresses the challenges to achieving fiscal discipline in a middle class of systems— federal or quasi-federal systems with semi-sovereign provincial governments for whom bailout expectations might be quite rational, at least for some of the provinces some of the time. Future research might build on the framework laid out here to examine the dynamics of fiscal adjustment and borrowing in other such countries including Argentina, Brazil, India,

South Africa, Spain, and perhaps even China, taking care to recognize that the fiscal system might create very different expectations and incentives for different regional governments.

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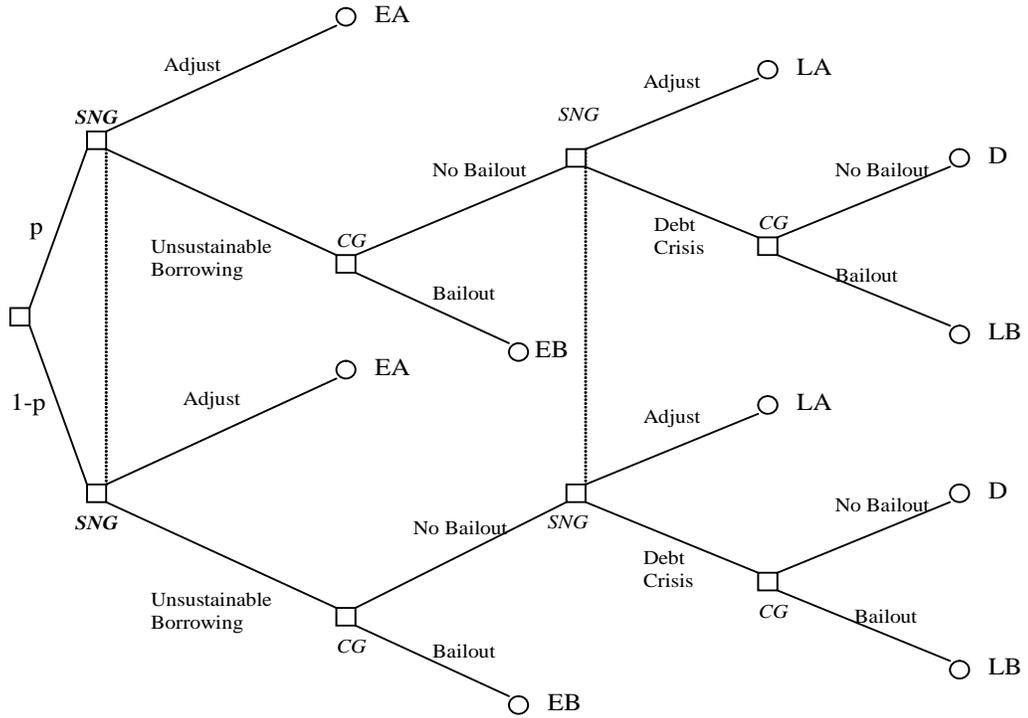
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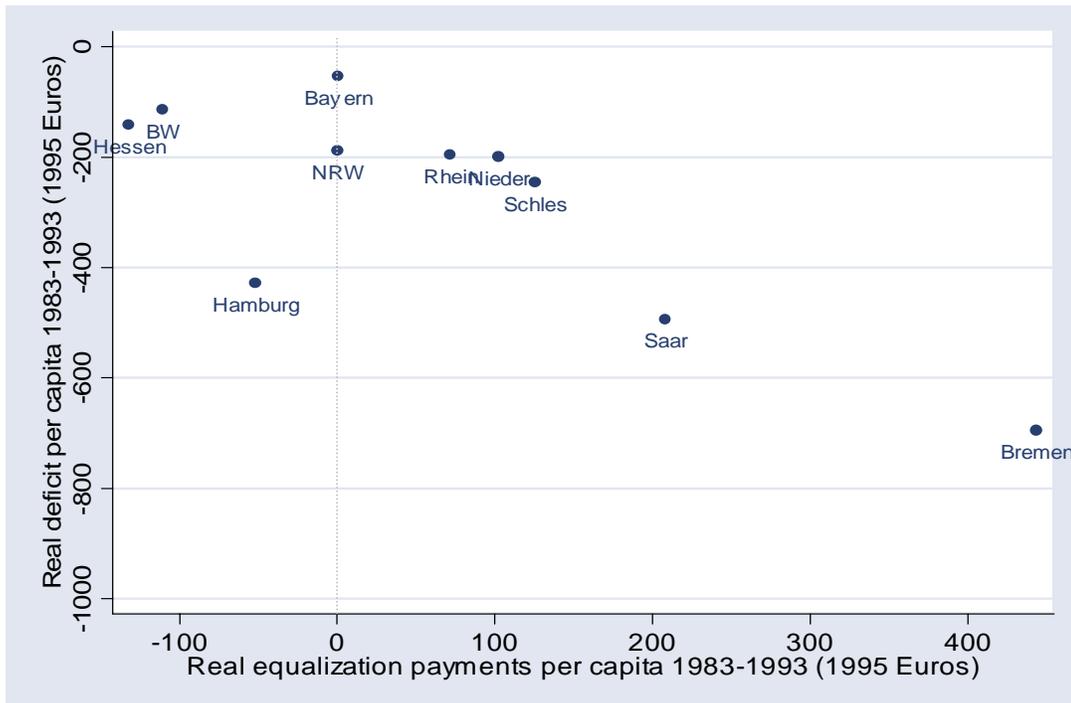
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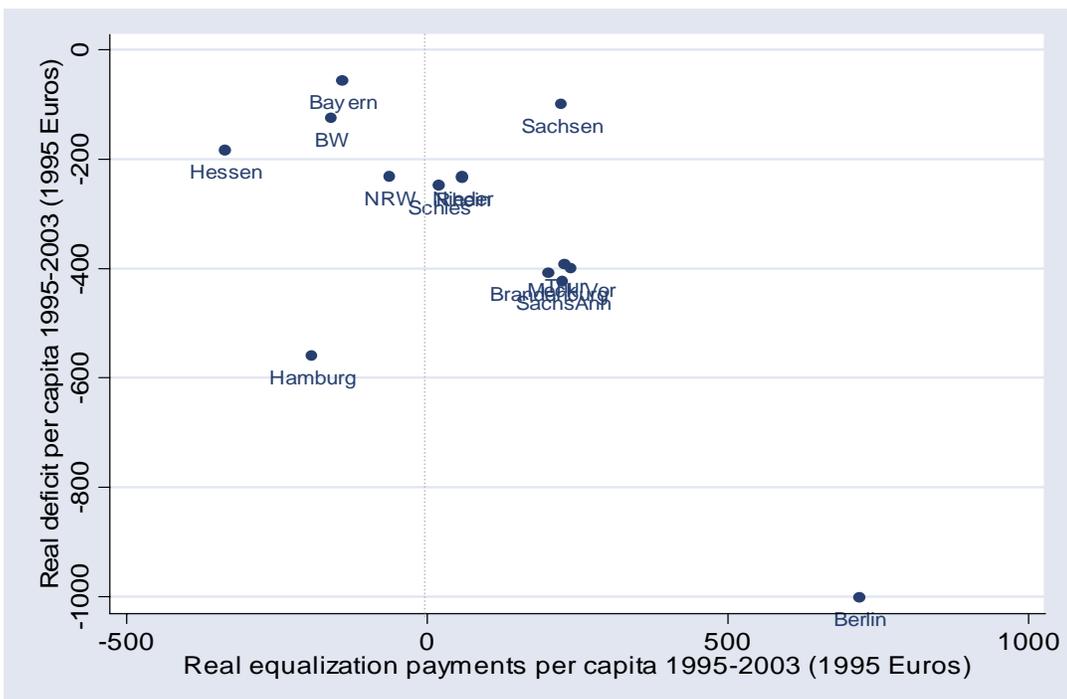
**Figure 1: Dynamic Bailout Game**



**Figure 2a: Equalization position and average deficits, 1983-1993**

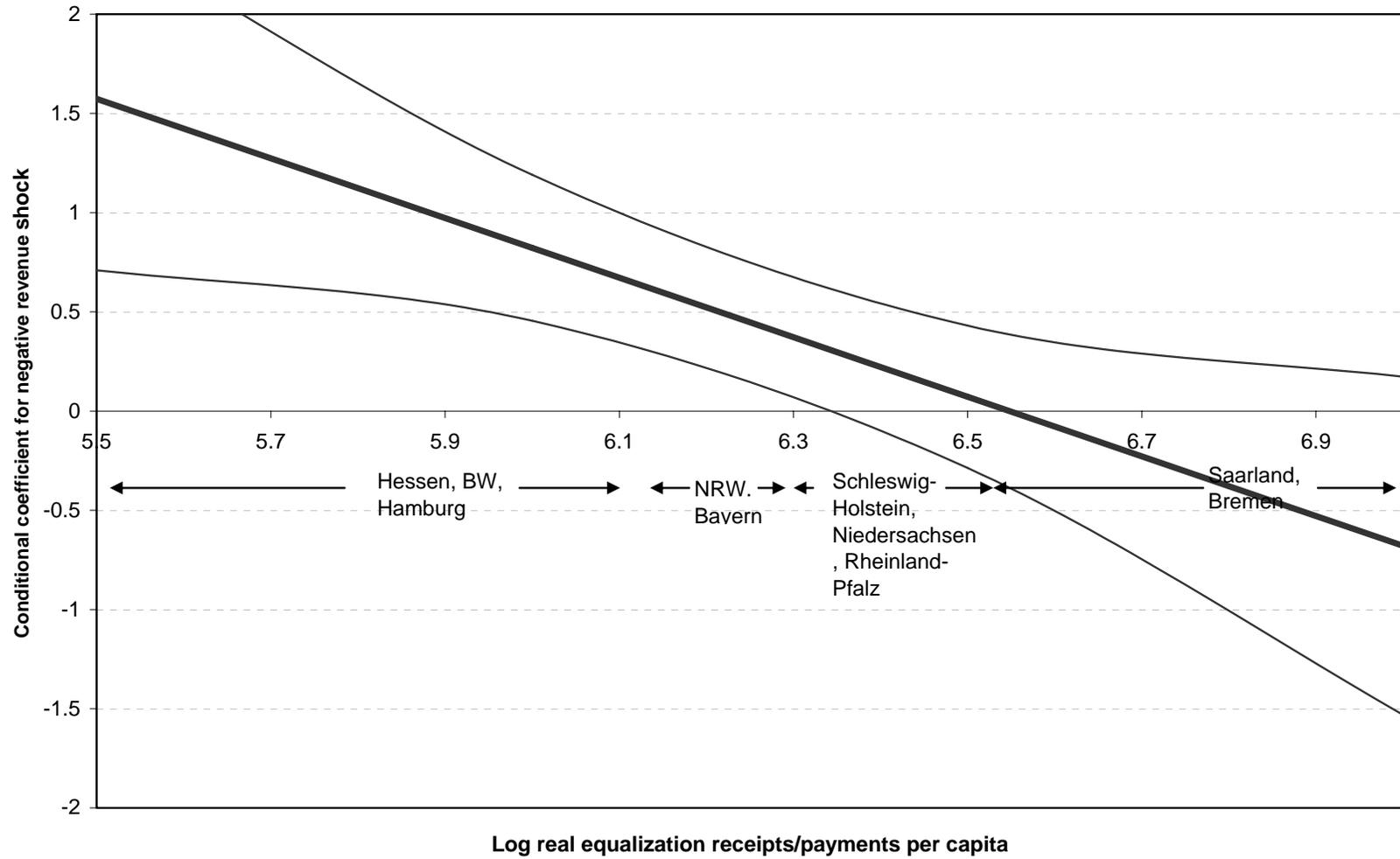


**Figure 2b: Equalization position and average deficits, 1995-2003\***



\* Excluding Bremen and Saarland due to federal intervention

Figure 3: Conditional coefficients for negative revenue shock (model 6)



**Table 1: Deficit Regressions**

Dependent Variable: Change log real surplus (deficit) per capita	Pre-unification: 1974-1993				Post-unification: 1995-2003			
	Model 1		Model 2		Model 3		Model 4	
	Coef.	PCSE	Coef.	PCSE	Coef.	PCSE	Coef.	PCSE
Lag log real deficit per capita	-0.91	(0.13) ***	-0.54	(0.11) ***	-0.78	(0.24) ***	-0.63	(0.19) ***
Change log real equalization per capita	-0.13	(0.05) ***	-0.19	(0.05) ***	0.11	(0.04) **	-0.005	(0.06)
Lag log real equalization per capita	-0.20	(0.05) ***	-0.23	(0.05) ***	0.03	(0.05)	-0.12	(0.06) **
Change unemployment	-0.03	(0.01) ***	-0.04	(0.01) ***	0.01	(0.02)	0.00	(0.02)
Lag unemployment	0.012	(0.004) ***	0.01	(0.004) ***	0.03	(0.01) **	0.01	(0.01)
Change log real GDP per capita	-0.37	(0.45)	-0.92	(0.53) *	2.95	(1.05) ***	2.54	(0.87) ***
Lag log real GDP per capita	-0.04	(0.06)	-0.23	(0.06) ***	-0.02	(0.50)	-0.39	(0.16) **
Election year	-0.03	(0.02) **	-0.04	(0.02) **	-0.09	(0.05) **	-0.08	(0.04) **
CDU/CSU absolute majority	-0.02	(0.02)	0.02	(0.01) *	0.28	(0.16) **	0.11	(0.05) **
CDU-FDP coalition	-0.01	(0.02)	-0.02	(0.02)	0.03	(0.08)	0.00	(0.03)
CDU-SPD coalition	0.075	(0.03) **	0.12	(0.03) ***	0.18	(0.13)	0.01	(0.05)
SPD absolute majority	-0.07	(0.02) ***	-0.07	(0.02) ***	0.08	(0.07)	0.02	(0.03)
SPD-Green coalition	-0.06	(0.03) **	-0.02	(0.03)	0.03	(0.08)	-0.01	(0.03)
SPD-PDS coalition					0.16	(0.21)	0.04	(0.09)
Federal-state co-partisanship	-0.05	(0.01) ***	-0.03	(0.01) **	-0.002	(0.04)	0.03	(0.03)
New (Eastern) state dummy							-0.31	(0.17) *
Constant	7.898	(1.06)	6.11	(1.09)	4.78	(1.94)	6.56	(2.03)
R-squared	0.57		0.38		0.51		0.42	
Number of observations	190		190		126		126	
Number of states	10		10		16		16	
Years	19		19		9		9	
Fixed Effects?	Yes		No		Yes		No	

\* p<.1    \*\* p<.05    \*\*\* p<.01

**Table 2: Expenditure adjustment regressions**

Dependent variable: Change log real expenditure per capita	Pre-unification: 1974-1993				Post-unification: 1995-2003			
	Model 5		Model 6		Model 7		Model 8	
	Coef.	PCSE	Coef.	PCSE	Coef.	PCSE	Coef.	PCSE
Lag change log real expenditure per capita	-0.08	(0.09)	-0.09	(0.09)	-0.07	(0.11)	-0.10	(0.12)
Positive revenue shock	0.09	(0.24)	-0.66	(2.46)	0.61	(0.19) ***	3.02	(1.12) ***
Positive revenue shock X status in equalization system (3-point scale)	0.08	(0.16)			-0.12	(0.14)		
Positive revenue shock X log real equalization per capita			0.14	(0.40)			-0.4	(0.18) **
Negative revenue shock	0.83	(0.28) ***	9.83	(4.30) **	0.76	(0.21) ***	0.86	(1.35)
Negative revenue shock X status in equalization system (3-point scale)	-0.38	(0.19) **			-0.23	(0.13) *		
Negative revenue shock X log real equalization per capita			-1.50	(0.69) **			-0.07	(0.21)
Log real equalization per capita			0.02	(0.02)			-0.02	(0.02)
Status in equalization system (3-point scale)	-0.002	(0.004)			0.004	(0.02)		
Change log real GDP per capita	-0.03	(0.15)	0.01	(0.15)	-0.20	(0.24)	-0.27	(0.25)
Lag log real GDP per capita	-0.05	(0.03) *	-0.06	(0.03) **	0.06	(0.09)	0.04	(0.09)
Change unemployment	-0.002	(0.004)	-0.002	(0.004)	-0.01	(0.004) **	-0.01	(0.004)
Lag unemployment	-0.003	(0.001) **	-0.004	(0.001) ***	-0.02	(0.003) ***	-0.01	(0.003) ***
Lag real log deficit per capita	0.20	(0.03) ***	0.21	(0.03) ***	0.09	(0.02) ***	0.08	(0.02) ***
Election year	0.01	(0.005) ***	0.01	(0.005) ***	0.02	(0.01) **	0.02	(0.01) **
CDU/CSU absolute majority	0.002	(0.01)	0.01	(0.01)	-0.04	(0.05)	-0.03	(0.04)
CDU-FDP coalition	-0.002	(0.01)	0.002	(0.01)	-0.01	(0.03)	-0.02	(0.03)
CDU-SPD coalition	-0.03	(0.01) **	-0.03	(0.01) *	-0.02	(0.04)	-0.02	(0.04)
SPD absolute majority	0.005	(0.01)	0.01	(0.01) *	-0.01	(0.03)	-0.01	(0.03)
SPD-Green coalition	0.01	(0.01)	0.01	(0.01)	-0.01	(0.03)	-0.01	(0.03)
SPD-PDS coalition					-0.003	(0.05)	-0.002	(0.04)
Federal-state co-partisanship	0.003	(0.004)	0.01	(0.004) **	0.01	(0.01)	0.01	(0.006)
Constant	-1.33	(0.26)	-1.48	(0.30)	-0.64	(0.31)	-0.39	(0.32)
R-squared	0.47		0.49		0.52		0.55	
Number of observations	180		180		132		132	
Number of states	10		10		16		16	
Years	18		18		9		9	
Fixed Effects?	Yes		Yes		Yes		Yes	

\* p<.1 \*\* p<.05 \*\*\* p<.01



## Appendix

Proceed by backward induction using beliefs. Begin with the subnational government's final decision whether to provoke a debt crisis. There is a critical updated belief about the resolve of the center,  $\bar{p}^*$ , that makes the SNG indifferent between late adjustment and provoking a debt crisis. Equate expected utilities:

$$U_{sng}(LA) = U_{sng}(D)\bar{p}^* + U_{sng}(LB)(1 - \bar{p}^*)$$

Solve for  $\bar{p}^*$ :

$$\bar{p}^* = \frac{U_{sng}(LB) - U_{sng}(LA)}{U_{sng}(LB)}$$

If  $\bar{p} > \bar{p}^*$ , SNG prefers "late adjustment" to provoking a debt crisis.

If  $\bar{p} < \bar{p}^*$ , SNG is sufficiently optimistic about the likelihood of a bailout to provoke a debt crisis rather than adjust.

Next consider the central government's first move. The resolute type always plays "no bailout."

The irresolute type, however, conditions its move on the likely response of the SNG. The SNG adopts a mixed strategy that avoids adjustment with probability  $z$  and conducts "late adjustment" with probability  $(1-z)$ . Find the probability,  $z$ , of the SNG playing "debt crisis" that makes an irresolute center indifferent between "no bailout" and "early bailout" at its first decision node:

$$U_{cgi}(EB) = U_{cgi}(LB)z + U_{cgi}(LA)(1 - z)$$

Solve for  $z$ :

$$z = \frac{U_{cgi}(EB) - U_{cgi}(LA)}{U_{cgi}(LB) - U_{cgi}(LA)}$$

The SNG must have beliefs equal to  $\bar{p}^*$  in order to play this mixed strategy. Now consider the CG's mixed strategy that creates these updated beliefs for the SNG. Upon observing "no bailout" in the first round of the game, the SNG must assess the probability that the center is in fact

resolute. There is no pure strategy separating equilibrium. That is, the SNG knows that there is a positive probability,  $q$ , that an irresolute center is masquerading by playing “no bailout” in the first round. Using Bayes’ rule:

$$p(R | nobailout) = \bar{p}^* = \frac{p(R)p(nobailout | R)}{p(R)p(nobailout | R) + p(I)p(nobailout | I)}$$

where R and I refer to “resolute” and “irresolute” central governments. This can be expressed as:

$$\bar{p}^* = \frac{p}{p + q - pq}$$

Solve for  $q$ :

$$q = \frac{p(1 - \bar{p}^*)}{\bar{p}^*(1 - p)}$$

Expressed in terms of SNG’s utilities for the outcomes:

$$q = \frac{p[U_{sng}(LA)]}{(1 - p)[U_{sng}(LB) - U_{sng}(LA)]}$$

Now it is possible to discuss the first move made by the subnational government. If the game starts with  $p > \bar{p}^*$ , the SNG will always adjust early. It is already sufficiently convinced of the center’s resolve that it would be foolish to avoid adjustment in an effort to attract bailouts.

However, when  $p < \bar{p}^*$ , the SNG is not necessarily deterred. It will compare the expected utility of pressing for a bailout, calculated from the center’s mixed strategy, with the expected utility of adjusting. The critical value for  $p$  can be obtained by finding the original belief at which the SNG is indifferent between early adjustment and starting down a path of unsustainable borrowing:

$$U_{sng}(EA) = p^*[U_{sng}(D)] + (1 - p^*)\{(1 - q)[U_{sng}(EB) + q[U_{sng}(LA)]]\}$$

Substitute for  $q$  and solve for  $p$ .

$$p^* = \frac{[U_{sng}(LB) - U_{sng}(LA)][U_{sng}(EA) - 1]}{[U_{sng}(LA)]^2 - U_{sng}(LB)}$$

To sum up, when  $p$  is greater than this expression, the SNG will adjust in the first round. This is a Perfect Bayesian Equilibrium. When beginning beliefs in the center's resolve are below this threshold, the subnational government plays "unsustainable borrowing" in its first move and the Perfect Bayesian Equilibrium involves the mixed strategies described above. In its first move, the resolved government always plays "no bailout" while the irresolute government plays "no bailout" with probability  $q$  and "early bailout" with probability  $1-q$ . If it observes "no bailout," the region chooses "debt crisis" with probability  $z$ , and "late adjust" with probability  $1-z$ . At the final stage, the resolved government always plays "no bailout" while the irresolute government always plays "late bailout."