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Fiscal Federalism in Germany: Stabilization and Redistribution Before and After Unification

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Fiscal Federalism in Germany: Stabilization and Redistribution Before and After Unification

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Abstract

We provide empirical estimates of the risk-sharing and redistributive properties of the German federal fiscal system based on data from 1970 until 2006, with special attention to the effects of German unification. We find that tax revenue sharing between the states and the federal government and the fiscal equalization mechanism (*Länderfinanzausgleich*) together reduce differences in per-capita state incomes by 37 percent during period 1970 to 1994. After the full integration of East German states into the mechanism in 1995, the redistributive effects increase slightly to about 39 percent. With respect to the insurance effect of the German fiscal system, our results indicate that the federal fiscal system offsets 47 percent of an asymmetric shock to state per-capita incomes. This effect has significantly decreased after the inclusion of the East German states in 1995. Furthermore, we find that the German fiscal system provides almost perfect insurance for state government budgets against asymmetric revenue shocks; also, its redistributive effect with regard to the tax resources available to state governments is very strong.

- *Keywords*: Regional Risk-sharing, Fiscal Federalism, Monetary Union
- *JEL Codes*: H77, E63, F42

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1 Introduction

The traditional theory of fiscal federalism (Oates, 1972) regards the payment of intergovernmental grants within a federation as an instrument to address the inefficiencies arising from inter-jurisdictional fiscal spillovers and to reduce inequalities in the supply of public goods across regions with different tax capacities and levels of income. More recent literature has pointed out that, in a world with imperfect capital markets, fiscal arrangements for risk sharing and redistribution of income across the states of a federation can play an important role for consumption smoothing (Boadway 2004; Bucovetsky 1998; Lockwood 1999). Such arrangements have received considerable interest in recent years, both in the context of designing the fiscal framework of the European Monetary Union (EMU) and in the design of new federal systems in developing countries (Boadway and Shah, 2007). One branch of this literature considers the role of such arrangements for redistribution and consumption risk-sharing among consumers living in different regions of a country or federation, which are exposed to region-specific shocks (e.g., Atkeson and Bayoumi, 1993; Wildasin, 1996; Persson and Tabellini, 1996a, 1996b; Bucovetsky 1998; Lockwood, 1999, Boadway, 2004). The other branch of the literature starts with Mundell's (1961) analysis of optimum currency areas. Following Kenen (1969), it argues that, in a world of sticky wages and prices, fiscal transfer arrangements among regions or states sharing the same currency can stabilize regional aggregate demand and employment by redistributing income between regions exposed to asymmetric cyclical shocks (European Commission, 1977a, 1977b; Sachs and Sala-i-Martin, 1992; von Hagen, 1992; Goodhart and Smith, 1993; Bayoumi and Masson, 1995; Athanasoulis and van Wincoop, 1998). This literature has played an important role in the design of EMU and its main point is nicely summarized by the former president of the European Commission, Jacques Delors (see Delors, 1989, p.89), in the blueprint for the EMU:

> "... in all federations, the different combinations of federal budgetary mechanisms have powerful "shock-absorber" effects dampening the amplitude either of economic difficulties or of surges in prosperity of individual states. This is both the product of, and the source of the sense of national solidarity which all relevant economic and monetary unions share."

The empirical work in this area has focused on the extent to which fiscal flows between different regions or between the regions and the central government offset regional differences in economic fluctuations at cyclical frequencies. Most of it has analyzed the US fiscal system. Sachs and Sala-i-Martin (1992) estimate that the tax and transfer flows between the US federal government and the states offset between 33 and 40 percent of a region-specific shock and, thus, provide considerable stabilization. von Hagen (1992) pointed out the importance of distinguishing between the (short-term) stabilization and (long-term) redistribution functions of federal fiscal systems, which Sachs and Sala-i-Martin neglected.[3] Later studies in this area adopted this distinction, and their empirical results commonly suggest that the contribution of the US fiscal system to stabilizing regional incomes is much smaller than what Sachs and Sala-i-Martin estimated, ranging between 10 and 30 percent. At the same time, the redistributive effects are large.[4] Empirical studies for other countries, including Canada, France, Italy, report similar results.[5]

This paper provides new evidence on the stabilization and redistributive properties of the federal fiscal system in Germany. Germany is a particularly interesting case in this context, because, like Canada and unlike the United States, it has an explicit, constitutional, and formula-based mechanism for fiscal equalization, which redistributes tax revenues among the states and the federal government. Yet, empirical evidence on properties of the German federal fiscal system with regard to consumption smoothing remains scant. This is most likely due to the intricacies of the rules of the system, data problems and the structural breaks connected with German unification in the early 1990s.[6]

To facilitate comparison with the results for other countries in the literature mentioned above, we follow the methodological approach of earlier studies. Our paper makes two contributions to the literature with regard to consumption smoothing and income redistribution. First, it provides an analysis of the stabilizing and redistributive properties with regard to state disposable income at all stages of fiscal equalization. This allows us to show the contributions of the different vertical ("federal-to-state") and horizontal ("state-to-state") transfers. Second, our analysis covers the pre-unification period, during which only the ten West German states participated in the system, and the post-unification period, which extended the system to the five East German states and the city state of Berlin. It thus provides evidence for the effects of unification on fiscal equalization in Germany.[7]

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[3] In this paper, we use the terms *stabilization* and *insurance* interchangeably.

[4] See Goodhart and Smith, 1993; Bayoumi and Masson, 1995; Mélitz and Zumer, 1998, 2002, van Wincoop (1995), and Kletzer and von Hagen (2001) for a detailed review of this literature.

[5] With regard to Canada, however, Smart (2004) points out that, due to lags in the calculation of the equalization grants, fiscal equalization may actually be destabilizing.

[6] Pisani-Ferry et al. (1993) study the stabilizing properties of German fiscal equalization, and they do so based on a methodological approach which is very different from the rest of the literature. They find that the fiscal system stabilizes between 34 and 42 percent of asymmetric shocks affecting individual states.

[7] Fiscal equalization is not the only mechanism of regional income redistribution in Germany. Federal health insurance, unemployment insurance and pension systems also provide powerful mechanisms for the same purpose. Several empirical studies have taken a broader perspective of the issue and analyzed the stabilizing properties of the fiscal system as a whole for the regions of Germany. Using the methodology suggested by Asdrubali et al. (1996), Büttner (2002) finds that, during the period from 1970 to 1997, the entire German fiscal system smoothes only around 15 percent of shocks to state income in Germany and that the fiscal equalization

Brennan and Buchanan (1980, chapter 9) analyze federal fiscal constitutions from a political economy perspective based on the assumption that politicians maximize the budgets they have available for public spending. They argue that intergovernmental transfers serve to suppress fiscal competition, which is the very purpose of federalism in their view, and, therefore, lead to inefficient outcomes.[8] Intergovernmental transfers help stabilize tax cartels among subcentral governments. Furthermore, the direction and size of intergovernmental transfers become functions of the political bargaining power of individual state governments. Specifically, Brennan and Buchanan predict that small states and relatively poor states in terms of tax capacity benefit most from such arrangements.[9] This view of fiscal equalization as a barrier against fiscal competition has played an important role in recent debates over fiscal federalism in Germany, where the large degree of redistribution of tax revenues among state governments strongly reduces the incentives for governments to attract potential tax payers and foster economic growth through good economic policies (e.g., Homburg, 1994; Peffekoven, 1994, 2001; Huber and Lichtblau, 2000; Lenk, 2000).

While the principle of fiscal equalization is grounded in the German constitution, the particular mechanism used for this purpose and its frequent changes over time have been regulated by federal legislation negotiated between federal and state governments. They are, therefore, the outcome of intergovernmental negotiations, in which the representatives of the regional and the federal governments fought over the distribution of tax revenues (Renzsch, 1989, 1991; Rothweiler, 1972; Selmer, 1994).[10] Several empirical studies have recently

mechanism contributes 6.8 percent to this. Of the remainder, about 5 percent of income smoothing comes from the federal unemployment insurance, and around 4.3 percent from the federal mandatory pension system. In a paper that focuses on the risk sharing properties of Germany's federal unemployment insurance with respect to regional labor income, Kurz's (2000) empirical investigation leads to a very similar result. In her study, about 8 percent of a shock to regional labor income is smoothed by the federal unemployment insurance. Additionally, she finds that unemployment insurance has only a small effect on long-term redistribution of regional labor incomes. He does not consider the effects of German unification. Kellermann (2001) uses German data from the same time period and distinguishes explicitly between pre- and post-unification data. The sample from 1970 to 1990 ("*pre*-unification") includes only the 10 states of the former West Germany; the sample from 1992 to 1997 ("*post*-unification") includes all 16 states of the unified Germany. Based on the same methodology as Asdrubali et al. (1996), she finds that public transfers smooth over 40 percent of shocks to state income. More recently, Jüßen (2006) investigates risk sharing and redistribution in post-reunification Germany based on a very disaggregated data set of 271 labor market regions. He finds that the German fiscal system provides no insurance against asymmetric income shocks over and above what is provided by private capital markets. Furthermore, the fiscal system turns out to be very effective in decreasing long-term differences in regional incomes leading to convergence of regional incomes towards the national average. Jüßen's data, however, cannot identify the effects of fiscal equalization.

[8] In contrast, Boadway (1992), among others argues that intergovernmental grants can help mitigate the adverse effects of excessive competition among local governments that would lead to races to the bottom in the provision of public goods.

[9] Pitlik (2004) provides a formal exposition of this argument based on the Baron and Ferejohn (1989) model of legislative bargaining.

[10] Thus, Selmer (1994, p. 343) writes: "The reform of fiscal equalization presents itself as an attempt, questionable in many respects, to embed the compromise regarding the contributions of the federal and the state governments to the transfers flowing into East Germany, which had been negotiated at a closed meeting in Bonn,

considered the distributional effects of fiscal equalization in terms of state tax revenues (Lenk 2004; Lenk and Birke, 2000; Pitlik 2004, Pitlik and Schmid 2000; Pitlik et al. 2001, 2006). These papers analyze the gains and losses states obtain due to fiscal equalization in per-capita or relative terms and show that they can be explained in terms of the bargaining power individual states have in the legislative process. More specifically, states which are relatively overrepresented in the upper house of Germany's parliament benefit the most from fiscal equalization, while states which are relatively underrepresented contribute the most to it.

Our paper adds to this strand of literature in several ways. First, we analyse the redistributive properties of fiscal equalization based on relative state tax revenues rather than absolute or relative gains from equalization. This gives a more direct representation of the redistributive properties of the system.

Second, we take the concept of fiscal federalism as an insurance mechanism and apply it to the political economy approach. Assume that state government representatives are risk averse. They care not only about the size but also about the stability of their budgets over time. They may then regard fiscal equalization not only as an instrument for redistribution but also for insuring state government revenues against idiosynchratic shocks. Bargaining over the design of a system of fiscal federalism then involves a trade-off between redistribution and insurance, which should be accounted for in the empirical assessment. In view of this, we analyze the stabilization properties of equalization with regard to state tax revenues, an aspect which has been neglected in the literature so far.

Our main results can be summarized as follows. With regard to consumption smoothing and income redistribution, we find, first, that the German federal fiscal system provides considerable redistribution of disposable per-capita income between states. It reduces pre-equalization differences in state disposable incomes by about 37 percent. This is comparable in magnitude to other federations. Most of it is achieved through tax sharing between the states and the federal government. Second, until 1994, the German federal fiscal system offset about 47 percent of asymmetric shocks to state incomes and thus provided significant stabilization. Again, most of this was achieved through tax sharing with the federal government, while equalization through horizontal transfers among the states offset only about 10 percent of asymmetric shocks to state disposable incomes. Since the inclusion of the new East German states in the system, the insurance effect has declined to about 19 percent. While large and small

November 11-13, 1993, into the formal framework for redistribution given by the existing fiscal constituion of Art. 106-107 of the German constitution." (our translation). See e.g. Persson and Tabellini (1996a,b) for a formal analysis of the difference between intergovernmental grants negotiated at the constitutional stage and grants negotiated in legislative bargains.

states did not benefit from the stabilizing function before 1995, city states enjoyed almost perfect stabilization of their disposable incomes. After 1995, the overall stabilizing function has decreased, but all states now benefit from it independently of their size. Third, while German unification has left the overall degree of redistribution unchanged, it has changed the contributions of the different stages of the system and, significantly, it has led to more redistribution among the West German states.

With regard to state tax revenues, we find, fourth, that the German federal fiscal system provides for significantly more redistribution of state tax revenues than of state disposable incomes, reducing pre-equalization differences by about 75 percent on average. Finally, we find that the system provides (almost) perfect insurance of state tax revenues against asymmetric shocks.

The rest of this paper proceeds as follows. In section 2, we explain the design of the federal fiscal system in Germany. Section 3 presents the data and provides some descriptive statistics. In section 4, we present our empirical methodology and our main empirical results. Section 5 concludes.

2 The Federal Fiscal System in Germany

2.1. Institutional Design and Developments

Germany is a federation of 16 states, of which 10 together with West-Berlin formed the Federal Republic of Germany from 1949 to 1990. Five East German states became additional members in 1990, and the (now united) city of Berlin also became a state at that time.[11]

The country's federal fiscal system is an attempt to reconcile two conflicting principles which are present in the German constitution (Renzsch, 1991). On the one hand, the state governments are autonomous and independent of each other and of the federal government in their budgetary policies, and they are individually responsible for carrying out their tasks effectively.[12] On the other hand, the German constitution requires the states to assure "*uniform living standards throughout the territory of the federation*".[13] With regard to tax revenues, the constitution mandates the federation to assure that all state governments have the financial means to supply their citizens with public goods and services of similar quantity and quality.[14] The tension between these two principles arises from the large differences in the economic strength and, hence, the tax capacity of the individual states. These differences call for transfers

[11] For a list of states, see table 9. West-Berlin had a special status in pre-unification Germany and was not part of the fiscal equalization mechanism during that time period.

[12] Grundgesetz (German Constitution) Articles 29, 30, and 109:1.

[13] Grundgesetz, Article 72:2, Para 3, and Artikel 106:3, Para 2.

[14] Grundgesetz, Article 107, see also Jung (2008).

among the states to achieve a greater degree of equality. In addition, the federal government can pay transfers to individual states in order to improve their fiscal conditions.

All taxes in Germany are collected by the states. This is a consequence of the fact that the federal government does not have its own administration to execute its policies; the German constitution mandates the states to execute all federal policies as their own concerns. All major taxes are legislated by federal law and the state governments participate in the legislative procedure through the Upper House of the German parliament (*Bundesrat*), the members of which are representatives of the state governments, not elected by the citizens. As a result, individual state governments cannot change the parameters of the main taxes and there is no tax competition among states.[15] Tax legislation including the assignment of revenues to the federal and state level is part of a broader process of political negotiations and trades between the federal and the state governments (Pitlik et al, 2001; Renzsch, 1991; Selmer, 1994).

Germany's Constitution of 1949 assigned the revenue of all taxes of unambiguous local incidence to the states, among them personal and corporate income taxes and business taxes, leaving the federal government only with the revenue from a sales tax, which was later replaced by a value-added tax (VAT), and some minor taxes. In order to secure it with a sufficient revenue base, the federal government initially received a third of the revenues from personal and corporate income taxes collected by the states; this share gradually climbed to 35 percent until 1969, with the states receiving a share of the revenues from VAT in return. Personal and corporate income taxes and VAT are called *Gemeinschaftsteuern* (shared taxes).

The 1949 Constitution called for subsequent federal legislation to regulate the sharing of revenues among the states and the federal government. This was achieved by the Fiscal Constitution Act (*Finanzverfassungsgesetz*) of 23 December 1955. It instituted a horizontal tax revenue sharing arrangement among the states (*Länderfinanzausgleich*) covering the revenues from all state taxes plus half of the local taxes accruing to the municipalities. The Act guaranteed every state a minimum of 88.75 percent of the national average per-capita revenue from this base from 1956 onwards. By 1959, this minimum had been raised to 91 percent. In 1967, the federal government started paying supplementary transfers (*Bundesergänzungszuweisungen*) to states with low tax capacities to further even out the remaining discrepancies.

The federal fiscal system was reformed in 1969. Half of the revenue from corporate income tax, 42.5 percent of the revenue from personal income tax, and 70 percent of the revenue from VAT were assigned to the federal government. The horizontal tax revenue sharing arrangement was changed to guarantee each state a minimum of 95 percent of the national

[15] Some tax competition occurs at the local level through business taxes.

average per-capita revenues from all state taxes and half of the revenue from local taxes. Over the next two decades, the federal share of personal and corporate income taxes remained virtually unchanged, but the federal share of VAT was adjusted numerous times and fluctuated between 70 percent in 1970 and 65 percent in 1990. After German unification in 1990, it fell to 63 percent by 1994.

German unification required another reform of the federal fiscal system to accommodate the large gap in tax capacities and per-capita incomes between the new East German and the incumbent West German states (Selmer, 1994). Between 1990 and 1994, transfers to East Germany were managed by the federal government while the financial relations between the latter and the West German states continued on the basis of the existing framework. A new federal fiscal framework was negotiated between the states and the federal government during this period. This was deemed necessary because a simple integration of the new states into the existing framework would have turned all West German states into net contributors, a prospect which was unacceptable for those that were net recipients previously. Thus, the negotiations of the new framework focused on the question how the transfers from West to East Germany would be shared between the federal government and the states. The new system, which took effect in 1995, fully integrated the East German states. It entailed a significant change in the formula for distributing VAT income. The federal share of VAT revenue dropped from 63 percent in 1994 to 56 percent in 1995, and then to 50.5 percent in 1996 and 1997, the remainder going to the state governments. Since 1998, local governments also receive a share of around two percent of VAT revenue taken from the states' share. In more recent years, the federal share has stabilized at around 53 percent and the state governments' share at around 45 percent.

Subsequently, we refer to *Länderfinanzausgleich (LFA)* as fiscal equalization. It is a formula-based mechanism and comes after the splitting of the revenues from shared taxes between the federal government and the states. Note that the latter already involves considerable redistribution of revenues among the states, since the incidence of shared taxes is very different across states. LFA itself is a three-stage process. At the first stage, the states' share of total national VAT revenues is redistributed among the states. 75 percent of the total VAT revenues attributed to the states are distributed among the states on an equal per-capita basis. The remaining 25 percent of the total VAT revenues are transferred to states with initial per-capita tax revenues from all state taxes of less than 92 percent of the federal average.[16] If the amount available for redistribution is not large enough, the transfers are scaled back proportionally. If

[16] The tax revenues considered at this stage include all pure state taxes as well as a state's share of personal and corporate income tax.

the amount available is more than what is needed, the remainder is distributed among the financially strong states on a per-capita basis.

At the second stage of LFA, tax capacities and resource needs are calculated for all states. Tax capacity is determined by the sum of state tax revenues[17] and 50 percent of the local taxes collected on a state's territory. Resource needs are calculated as the average per-capita state tax revenues in Germany multiplied by the population of the respective state.[18] The difference between tax capacity and resource needs determines whether a state pays or receives additional, horizontal transfers under LFA. Financially weak states receive payments lifting them to at least 92 percent of federal average per-capita tax revenues. If a state's revenues are between 92 and 100 percent of the federal per capita average, it receives transfers that amount to 37.5 percent of that difference. Until 1995, states with revenues exceeding 102 percent of the national average paid contributions to LFA. For per-capita revenues between 102 and 110 percent of the federal average, the contribution was equal to 70 percent of the difference; for per-capita revenues above 110 percent of the federal average, the contribution was 100 percent of the difference between the state's revenues and the federal average. As a result, the differences in per-capita tax revenues among the states after redistribution ranged between 95 percent and 104.4 percent of the federal average.

The 1995 reform of LFA modified these rules. For per-capita revenues between 100 and 101 percent of the national average, the contribution is now 15 percent of the difference, for per- capita revenues between 101 and 110 percent of the federal average, it is 66 percent of the difference, and for per-capita revenues above 110 per cent of the federal average, it is 80 percent of the difference. Contributing states must be left with at least 95 percent of the average per-capita revenues after redistribution. Together with the supplementary payments, all states have at least 99.5 percent of the average per capita revenues.

At the third stage of LFA, the federal government makes payments to the states to further reduce the differences in per-capita tax revenues. These "supplementary transfers" are general-purpose grants which are computed on the basis of special financial needs and the per capita VAT revenue of the financially weak states. Before 1995, the total volume of these grants was capped at two percent of total VAT revenues. The 1995 reform lifted this cap and greatly increased the role of these payments in order to provide the East German states with sufficient fiscal resources (Dickertmann and Gelbhaar, 1996; Pitlik and Schmid, 2000; Selmer, 1994). Furthermore, it introduced a number of new supplementary grants targeting smaller West

[17]This sum now includes the VAT revenue assigned to a state in the first stage.

[18]At this stage, the special financial needs of the city states Hamburg and Bremen (and later Berlin) are recognized by attributing them with larger than actual populations.

German states, all East German states, as well as the West German states Bremen and Saarland, which were facing difficulties with the transition from the old equalization system.[19] In 2000, 11 of the 16 states received supplementary grants suggesting that they respond more to political bargains between states and the federal government than purely distributional concerns, which, in principle, could be addressed at the earlier stages of the system (Selmer, 1994). The discretionary nature of these new vertical grants has reduced the transparency that previously characterized German fiscal equalization (Guihéry, 2001).

In 1998, the states of Baden-Württemberg, Bavaria, and Hesse, all three net contributors to LFA, challenged the federal fiscal system before Germany's Constitutional Court. In its 1999 ruling, the court demanded another reform of the system, which took effect in 2005. The reform changed the definition of tax capacity to include 64 percent of municipal taxes and the transfer and contribution rates to strengthen the incentives for state governments to improve the tax capacity of their states. Based on a simulation model for 2005, Lenk (2004) argues that the main effect of this reform was a strengthening of the financial position of the states at the cost of the federal government.

To summarize, the federal fiscal system in Germany involves the following steps: (1) Splitting of tax revenues from shared taxes between the federal and state governments; (2) LFA, which has three stages, (2A) horizontal redistribution of VAT revenues, (2B) horizontal equalization payments, and (2C), vertical supplementary transfers from the federal to state governments.

2.2. Empirical Hypotheses

The purpose of this paper is to provide an empirical assessment of fiscal equalization in Germany. We consider two aspects of the system, the traditional view of equalization as an instriument for income redistribution and regional income insurance, and the political-economy view that regards equalization as an instrument for state government representatives to obtain larger and more stable budgets.

Regarding the traditional view, our empirical hypotheses are straightforward: Equalization should reduce income differences among states and reduce income fluctuations around a common mean income.

Regarding the political-economy view, ecent empirical studies for Germany (Lenk 2004; Pitlik 2004, Pitlik and Schmid 2000; Pitlik et al. 2001, 2006) have shown that the gains and losses states obtain due to the federal fiscal system can be explained by arguments drawn

[19] These two states had received bail-outs for their excessive debts in the early 1990s.

from political economy as suggested by Brennan and Buchanan. The first argument is that states coming into the system with relatively weak tax revenues should benefit the most, because, in the negotiations over the rules of equalization, they have the least to lose and, therefore, do not have to make large concessions to other states. In line with this, these studies find that the gains states obtain through the system are strongly negatively correlated with their pre-equalization tax revenues. One should note, however, that the same correlation pattern would also obtain if the federal fiscal system objectively aimed at reducing inequalities in the states' disposable revenues per capita.

The second argument starts from the observation that states are not equally represented in the Bundesrat, the Upper House of the German parliament, which must agree on any changes in the rules of the system. Specifically, large states have a much smaller number of seats per citizen in the upper house than small states and the small states can outvote the larger ones.[20] In legislative decisions concerning fiscal federalism in the Upper House, small states are attractive candidates for winning coalitions, because they bring relatively many votes. Furthermore, smaller states tend to be fiscally weak compared to larger ones. As explained by Pitlik (2004), one should, therefore, expect small states to favor stronger redistribution of tax revenues and, due to their strong relative bargaining power, one should also expect these states to gain more from the federal fiscal system than large states. This hypothesis is confirmed in terms of absolute transfer amounts by Pitlik (2004) and Pitlik et al (2001, 2006).

In this paper, we carry this reasoning further in three respects. First, German unification has increased the number of small and financially relatively weak states. By doing so, it has increased the bargaining power of the small and relatively weak West German states in the Upper House. In view of this, our hypothesis is that these states are among the winners of the reform of the federal fiscal system that occurred in 1995.

Second, while the studies mentioned above only consider the redistributive effects of the entire system, our analysis allows us to look at the effects of the various stages of the system. This is interesting, because the nature of the political negotiations changes from the perspective of the states. Splitting the revenues from joint taxes with the federal government (step one of the process) is a non-zero sum game, where the states as a group can benefit at the cost of the federal government and states may be willing to accept more redistribution among themselves for the benefit of obtaining a larger share of the revenues from these taxes jointly. In contrast, the horizontal revenue sharing at stages 2A and 2B is a zero-sum game for the states where redistribution may be more difficult to agree on. Finally, if, as argued by the literature, federal

[20] See table 9.

supplementary grants mainly respond to political bargains between individual states and the federal government, we expect equity concerns regarding the distribution of revenues the states to play a minor role at best at stage 2C. This suggests that redistribution is strongest at the stage of revenue splitting, followed by stages 2A and 2B and weakest at stage 2C.

Third, if state governments value the prospect of getting insurance of their tax revenues against asymmetric shocks from the federal fiscal system, there may be a trade-off between redistribution and insurance of tax revenues in the negotiations over the rules of fiscal federalism. This opens up the possibility that states make larger concessions in terms of redistribution for the benefit of obtaining more insurance. This implies that, in order to show that small and fiscally weak states can exploit their bargaining power, it is not enough to show that they obtain larger net transfers in the federal system, because this could also be the outcome of a trade of more redistribution for more insurance for the larger states. Therefore, we hypothesize that the larger states did not get more tax revenue insurance in return for agreeing to more redistribution in favor of the smaller states.

3 Data and Descriptive Statistics

In this section, we provide a more detailed description of the variables used in the panel data analysis to estimate the amount of risk sharing and redistribution provided by German fiscal equalization. We construct two different data sets: The first consists of annual data of the 10 West German states from 1970 to 1994. Comparable data do not exist for East Germany, and the German Democratic Republic was not organized as a federal system. The second data set contains annual data of all 16 German states covering the period from 1995 to 2006. Both panels are balanced. We follow previous literature and construct *state income* by adding up net state income at factor prices and all tax revenues with incidence in the state. These tax revenues include all federal (*Bundessteuern*), state (*Landessteuern*), and local taxes (*Gemeindesteuern*), plus the taxes shared between all three levels of government (*Gemeinschaftsteuern*).

We use four different versions of state disposable income corresponding to the four stages of the German federal fiscal system included in our paper. The first includes state income (as defined above) minus all federal taxes, the federal share of the shared taxes, and the federal share of the local business tax (*Gewerbesteuerumlage*). The result is the sum of net state income at factor prices plus all state and local taxes that remain with either the state or the state's local governments. The law on LFA governs the next two steps in the redistribution of tax revenue. In the first step, VAT revenues are redistributed among the states. The second definition of state disposable income thus includes VAT transfers received (+) or paid (–) from or to other states. In the second step of LFA, states make further transfer payments among each other. Hence, the third definition of state disposable income adds or subtracts transfers from the second definition. Finally, the forth definition of disposable income includes any additional federal grants paid to a state (*Bundesergänzungszuweisungen*).

For the period from 1970 to 1994, we use national accounting data provided to us by the Statistical Office of Baden-Württemberg. Data on tax revenues before and after redistribution come from publications of the German Federal Statistical Office (Statistisches Bundesamt 1977, 1989, 2000). Very detailed tax data on the local, state, and federal level for the years 1991 to 1994 were provided by the Statistical Office of Baden-Württemberg. Data on VAT redistribution and state-to-state transfers are provided in the annual publications of the Upper House of Parliament (Bundesrat, various years). All nominal variables for this sample period are deflated with the West German GDP deflator with base year 1991.

For the period from 1995 to 2006, we use national accounting data provided online by the German federal and state statistical offices (Statistisches Landesamt Baden-Württemberg, 2008) which is based on a standardized European Union methodology (ESVG1995). Note that, because of the change in accounting methods, the data for the two sub-periods are not directly comparable. Very detailed tax data on the local, state, and federal level for the years 1995 to 2002 is provided by the Statistical Office of Baden-Württemberg; data for the years 2003 to 2006 is available online from the German Federal Statistical Office (Statistisches Bundesamt, various years). Again, data on VAT redistribution and state-to-state transfers is published annually by the Upper House of Parliament (Bundesrat, various years). All data for the period from 1995 to 2006 is deflated by state-specific GDP deflators with base year 1991.

Table 1 reports some basic statistics for West Germany and the sample period from 1970 to 1994. In 1970, real GDP per capita among the 10 West German states ranged from 82 to 171 percent of the federal average, with the standard deviation amounting to around 16 percent of the federal average. Over the next two and a half decades, the range narrowed slightly from 83 to 167 percent of the average. The standard deviation from the average remains virtually unchanged with 15 percent of average per capita real GDP. It is noteworthy that per-capita VAT transfers and state-to-state transfer receipts did not change significantly as a percentage of average GDP over time. State-to-state transfer payments even fall both in absolute value and as a percentage of GDP. However, federal transfers noticeably went up (in both absolute value and as a percentage of GDP), particularly after German unification.

[Table 1 about here]

In Table 2, we report these same basic statistics for the data set from 1995 to 2006, when all 16 states were included in LFA. Looking at per capita real GDP, the gap between the poorest and richest states appears to be narrowing over time. Not unexpectedly, transfer payments – especially from VAT revenue – increased significantly compared to the earlier time period as a result of including the much poorer East German states in the fiscal equalization mechanism.

[Table 2 about here]

Tables 3 and 4 present the same statistics for the East and West German states separately during the period 1995 to 2006. The tables show, first, the marked economic heterogeneity across these two groups. Average net state income per capita in 2006 was about 78 percent larger in West Germany than in East Germany. This gap widened over the 12 years under consideration. In 2006, the largest per-capita GDP in an East German state was still considerably smaller than the smallest per-capita GDP in a West German state. Tax capacity, measured as average tax revenue per capita is about 160 percent larger in West Germany than in East Germany. Second, the tables show that East German states are net receivers in LFA with average per-capita horizontal transfers increasing from 229 to 271 euros. Average per-capita horizontal payments in West Germany increase from 70 to 78 euros over the same period. At the same time, average per-capita federal grants to East German states increased from 416 to 603 euros, while federal grants paid to West German states fell from 48 to a mere 10 euros.

4 Redistribution and Stabilization

4.1. Methodology

The literature of the 1990s has used a variety of empirical approaches to estimating and stabilization and redistributive properties of fiscal federal systems. In an important contribution, Mélitz and Zumer (2002) review this literature and develop a canonical model, which encompasses the earlier approaches and facilitates comparison across different studies. We apply their approach to Germany. Let X_{it} be the ratio of per-capita state income in state *i* at time *t* and the national average per-capita income at time *t*. Furthermore, let Y_{it} be the ratio of per-capita *state disposable income* in state *i* at time *t* and the national average disposable income per capita. For our purposes, X_{it} refers to state income before and Y_{it} to state income after the application of the different stages of the federal fiscal system. Let variables without time indices, X_i and Y_i, denote the sample period averages, Mélitz and Zumer start from the following equation:

$$Y_{i,t} = \alpha_d + \beta_d X_i + \beta_s (X_{it} - X_i) + e_{it};$$
$$i = 1,...,M; t = 1,...,T \qquad (1)$$

In equation (1), e_{it} is a stochastic disturbance. The coefficient β_d describes the effect of a change in the relative long-run average state income on the relative long-run average state disposable income. A coefficient of β_d=1 implies no redistribution at all, while β_d =0 implies "full redistribution" as a change in relative state income does not affect state disposable income. Thus, (1- β_d) gives the degree of redistribution achieved by the stage of fiscal equalization under consideration. Furthermore, the coefficient β_s relates deviations of relative state income at time *t* from the relative long-run average state income to deviations of relative state disposable income from its relative long-run average and describes the stabilization aspect of the federal fiscal system. Again, (1-β_s) indicates the degree of stabilization provided by the fiscal system. Mélitz and Zumer decompose equation (1) into two parts to illustrate this point:

$$Y_i = \alpha_d + \beta_d X_i + v_i, \qquad (2)$$

$$Y_{it} - Y_i = \beta_s (X_{it} - X_i) + u_{it} \qquad (3)$$

where v_i and u_{it} are random disturbance terms. Equations (2) and (3) define the two regressions we use below to determine the degrees of redistribution and stabilization achieved by fiscal equalization in Germany. Note that equation (2) uses the cross section only. This might be a problem, if the state economies had grown with very different trend growth rates during the sample period, which, however, was not the case. We estimate equation (2) by OLS and equation (3) using a panel estimator with robust standard errors to correct for heteroskedasticity and serial correlation of the errors. To check for robustness, we also estimated equation (3) with time fixed effects that would pick up any relevant effects at the aggregate level such as the country-wide business cycle or political events such as federal elections. Since the time fixed effects did not change the results, we do not report these estimates below.

4.2 Results for State Income

4.2.1. Redistribution

Table 5A presents the results of estimating equation (2), where 1-β_d corresponds to the degree of redistribution. The table reports the standard errors of the estimates together with an indication of statistical significance. Note that the latter refers to the Null of β_d = 0 or (1- β_d) = 1.

For the time period from 1970 to 1994, we find that the degree of redistribution provided by Germany's federal fiscal system ranges from 31.4 to 36.9 percent, depending on which elements of the system are included. Most redistribution occurs at the stage of sharing joint taxes with the federal government. It reduces differences in per-capita state disposable income by 31.4 percent. This is less than von Hagen's (1992) result for the US of 47 percent, but in the same range as Mélitz and Zumer's (2002) and Bayoumi and Masson's (1995) results for Canada. The redistributive effect of the horizontal VAT redistribution and state-to-state transfers together is only 5.2 percent, coming mainly from the redistribution of VAT revenue. The contribution to redistribution of vertical transfers from the federal government to states is negligibly small.

After the inclusion of the East German states in LFA in 1995, the degree of redistribution at the stage of tax sharing with the federal government falls to 25 percent, while the contribution of VAT redistribution increases to 9.4 percent. Overall, transfers among the states have become much more important as an instrument for income redistribution after 1995. Vertical federal grants now contribute about 2.6 percent of redistribution.

In table 5B, we repeat the regressions for the later period, but we now ask to what extent the federal fiscal system leads to redistribution of income among the West and the East German states separately. We do this by using East and West German averages, respectively, as reference levels for state income instead of the national average. The table shows two interesting features. First, both the transfer of the federal tax share and the redistribution of VAT revenues have become significantly more redistributive among the West German states compared to the earlier time period. Overall, the federal fiscal system now eliminates 63 percent of the differences in per-capita incomes among West German states compared to 37 percent before 1995. Thus, the relatively poor West German states have benefitted greatly from the inclusion of the East German states into the system. Second, the degree of redistribution is much lower among the East German states. Overall, it is less than half the degree of redistribution among West German states and about two thirds of the degree of redistribution achieved at the national level. State-to-state transfers even increase income inequality slightly among East German states, and federal grants do not contribute much to redistribution at all. Thus, after 1995, the federal fiscal system is more effective in closing the income gap between East and West German states than the gap among East German states.[21]

[Tables 5A and 5B about here]

[21] To check the robustness of our results with respect to the fiscal system's reform of 2005, we also split the post-1994 sample into subsamples 1995 to 2004 and 2005 to 2006 for both the state disposable income and the state tax revenue redistribution regressions. In both cases, the results do not change significantly and coefficients from the two subsamples differ little.

4.2.2 Stabilization

Next, we turn to estimating equation (3). Our results are presented in tables 6A and 6B. We pool our data for the German, West German, and East German samples, but we also distinguish stabilization effects by state size.[22] Let us first focus on our pooled samples in table 6A. In the period from 1970 to 1994, the cumulative degree of stabilization is 46.7 percent. Of the components of the fiscal equalization mechanism, the contribution of the horizontal transfers is around 10 percent. While the redistribution of VAT revenue contributes 3.3 percent of stabilization, horizontal transfer payments between states contribute the largest part with 6.9 percent. Federal grants to states play the smallest role with 1.7 percent.

[Table 6A about here]

For the period from 1995 to 2006, the stabilization properties of the federal fiscal system decrease considerably to 19.4 percent, but the difference is not large enough to be statistically significant. The decline is due entirely to the smaller effect of tax revenue sharing between the states and the federal government. In contrast, the contribution of horizontal transfers and the effect of supplementary federal grants remain about the same.

In columns 3 to 5 and 8 to 10 of table 6A, we separate the German states into large states, small states, and city states. We ask to what extent the stabilization properties are different for states of different size. Conventional macro economics would argue that stabilization is more important for city and small states, since their economies tend to be more specialized and, hence, more exposed to sector-specific shocks than the economies of large states. The table reports the stabilization effect for large states' incomes ("large") and the *additional* stabilization effects for small ("small") and city states ("city"). The negative coefficients indicate that, before 1995, the federal fiscal system had a small but statistically significant destabilizing effect on state incomes of large states. This was mainly due to the transfer of the federal government's share of tax revenues (– 9.8 percent). In contrast, LFA had a small stabilizing effect, so that the overall effect was reduced to around negative 6.7 percent. The results for city states differ strongly: state incomes are almost completely stabilized by the fiscal system. The coefficients for small states point in the same direction. However, the differences to the large states' coefficients are not statistically significant.

After 1995, tax sharing with the federal government has a small stabilizing effect on state income for large states. Together with the later stages of equalization, the entire system

[22] For the categorization of states by state size, see table 9.

now has a statistically significant albeit small stabilizing effect of around 17 percent for the large states. Note that the definition of an asymmetric shock here is relative to the average income for all of Germany rather than for West Germany alone. There is no significant stabilization advantage for city states any more. In table 6B, we perform similar exercises using the West and East Germany sub-samples separately for the period since 1995. The results for the pooled data for West Germany show that the stabilizing effect of the fiscal system (31.1 percent) is lower than in the pre-unification period. The largest contribution comes from tax revenue sharing between the federal government and West German states (16.2 percent), followed by VAT redistribution, which has a stabilizing effect of about 11.4 percent. Distinguishing the effects according to state size reveals that city states are much better protected against asymmetric shocks than large and small states.

For East Germany, we distinguish between so-called area states (Brandenburg, Mecklenburg-Vorpommern, Saxony-Anhalt, Saxony, and Thuringia) and the city state of Berlin. As table 6B shows, the stabilizing effect of the fiscal system for Berlin is indistinguishable from that for the other states. Overall, about 15 percent of asymmetric shocks are smoothed. Tax sharing with the federal government has a small, stabilizing effect on state income (around 5 percent). LFA delivers the larger contribution with about 10 percent.

In sum, our results suggest that the federal fiscal system provides much less insurance against asymmetric shocks to state disposable incomes since 1995 compared to the earlier period.

[Table 6B about here]

4.3. Results for State Tax Revenues

4.3.1. Redistribution

In this section, we consider the properties of Germany's federal fiscal system in a different dimension. Rather than asking to what extent it leads to a redistribution and insurance of per-capita disposable incomes, we ask to what extent it serves to redistribute and insure per-capita state government revenues. While the previous sections have focused on the importance of the system for consumers living in the different states of Germany, we now focus on the role it plays for governments. The methodology remains the same with the exception that "income" now refers to state government tax revenues. Recall that our concept of tax revenues is more comprehensive than the revenues considered for the purposes of fiscal equalization in Germany. Thus, in the regressions below, we are not just reproducing the formulas applied at the various stages of the system. Instead, we estimate its effects on total state government tax revenues.

Tables 7A and 7B show the results for redistribution of state tax revenues. Before 1995, almost 60 percent of all revenue differences were eliminated at the stage of sharing tax revenues with the federal government. VAT redistribution adds another 15 percent; state-to-state transfers 3.5 percent. Federal grants, however, increased revenue inequality among the states by about 7 percent. Overall, the redistribution effect exceeds 70 percent.

From 1995 onwards, tax sharing and LFA are almost equally effective. Tax sharing eliminates 40.7 percent of income differences, while VAT redistribution adds 32.2 percent and state-to-state transfers add 4.5 percent. Federal grants contribute virtually nothing to the redistribution of tax revenues. Overall, the system has become slightly more redistributive than before. Our results indicate that fiscal equalization plays a much more significant role for redistributing tax revenues among governments than for redistributing income among citizens.

[Table 7A about here]

In table 7B we look at the redistributive properties of the federal fiscal system among West and East German states separately after 1995. We find that the overall redistributive effects of the fiscal system are quite large in both subsamples (West: 89.2 percent; East: 67.8 percent), but smaller for East Germany. Tax sharing with the federal government has very different effects on both subgroups; but tax sharing and VAT redistribution taken together eliminate more than 75 percent of the differences in state tax revenues. However, state-to-state transfers have opposite effects on state tax revenues in West and East Germany. They add about two percent to the redistribution effect in the West, but increase inequality in tax revenues in the East by about 15 percent. Overall, the degree of redistribution among West German states has increased by about 18 percent compared to the pre-unification period. This is due entirely to the effect of federal grants at the last stage of LFA. As in the case of state disposable incomes, this indicates that the relatively poor state governments in West Germany have benefitted significantly from the 1995 reform of the federal fiscal system.

Among the East German states, tax sharing with the federal government has only a small redistributive effect. VAT transfers eliminate 65 percent of differences in per-capita state tax revenues, but horizontal transfers increase revenue inequality. Federal grants compensate part of that latter effect. Overall, fiscal equalization eliminates about 68 percent of the differences in per capita tax revenues among East German state governments. This is less than the corresponding effect among West German states.

[Table 7B about here]

4.3.2. Stabilization

Tables 8A and 8B show our results for insurance against asymmetric shocks to state tax revenues.

[Table 8A about here]

In the pooled data , before 1995, tax sharing with the federal government absorbed 63 percent of all asymmetric shocks to state tax revenues among the West German states. The subsequent stages of fiscal equalization add more insurance, and the system including federal grants provides perfect insurance against such shocks. Distinguishing by state size reveals that tax sharing absorbed about 28 percent of asymmetric shocks in large and small states, but almost 70 percent in city states. At the later stages of fiscal equalization, the overall effect for small and city states increases to almost perfect insurance.

After 1995, the federal fiscal system has become somewhat less effective in insuring state tax revenues, although the difference is not statistically significant. The entire system still absorbs a remarkable 87 percent of asymmetric shocks to state tax revenues. Tax sharing with the federal government provides about 40 percent of the insurance, and VAT redistribution provides an additional 44 percent. Horizontal state-to-state transfers contribute about 10 percent. Federal grants now weaken the insurance effect by about 7 percent. When we control for state size, our results suggest that, except for the last stage, city states receive more insurance than large and small states.

Finally, we again split our sample into East and West German states and investigate the stabilization properties of the fiscal system for these subsamples separately (table 8B).

[Table 8B about here]

For West Germany, the overall fiscal system absorbs about 89 percent of asymmetric shocks to tax revenues, with the largest contribution coming from VAT redistribution with about 45 percent. Federal grants are again slightly destabilizing. When we distinguish by state size (columns 2 to 4 in the table), it turns out that tax sharing is stabilizing for all states with about 20 percent. Including VAT redistribution, stabilization increases to about 43 percent for small and large states, and to about 87 percent for city states. After state-to-state transfers, city states' tax revenues remain significantly better insured than those of large and small states (large and small: 70.1 percent; city: 96.9 percent). The magnitude and differences (due to state size) of the insurance effect remain similar over time. Thus, after 1995, large and small states receive less insurance against asymmetric revenue shocks than city states in West Germany.

For East Germany, the results are less conclusive. In the pooled data, tax sharing with the federal government together with the first two stages of LFA provides almost perfect insurance against asymmetric tax revenue shocks. However, federal grants at the last stage of LFA have a destabilizing effect and reduce the insurance effect to 69.2 percent. The distinction between small states and the city state of Berlin suggests that the fiscal system may provide less insurance for Berlin than for the other five East German states, but the effects are not statistically significant. Also, federal grants seem to have a much more destabilizing effect on Berlin than on the other states. But again, the effect is not statistically significant.

5 Conclusion

Our analysis explores the redistributive and stabilizing properties of the federal fiscal system in Germany, using data from 1970 to 2006. The system features a formula-based mechanism redistributing tax revenues between the states and the federal government and among the states. It is an outflow of the constitutional mandate to secure equal living conditions for all citizens in the country. To the best of our knowledge, ours is the first study analyzing both the stabilization and redistributive properties of the fiscal system of pre-unification Germany. It is also the first study directly comparing the effectiveness of the German fiscal system pre- and post-unification.

We find that the federal fiscal system achieves a significant degree of redistribution of income and of stabilization of asymmetric shocks to state incomes in Germany. Most of this is achieved by the sharing of tax revenues between the states and the federal government at the first stage of equalization. However, the system is much more effective in eliminating differences in state tax revenues and in shielding state budgets from the impact of asymmetric revenue shocks. This suggests that the politicians who negotiated fiscal equalization since the beginning of the Federal Republic cared more about its implications for state governments than for private households in their regions. Future research should address the question to what extent this focus on state budgets rather than household incomes distorts the welfare effects of fiscal equalization. Another important question is, what incentive effects a system creates that eliminates all differences in per-capita revenues across state governments and completely shields budgets against the effects of state-specific economic shocks.

Furthermore, we find that the redistributive effect of the federal fiscal system has slightly increased since the inclusion of the East German states, and that it equalizes incomes and tax revenues among West German states much more strongly than before. In this sense, the relatively poor West German states are among the winners of the reforms of fiscal equalization that came into effect in 1995. Obviously, German unification has not only led to large fiscal transfers from the Western to the Eastern part of the country. It has also increased transfers among the West German states. There is also a slight decline in the degree of insurance against asymmetric shocks to state tax revenues provided to large West German states, while the degree of insurance provided to small and city states remains the same. A suggestive interpretation is that, in the negotiations between the federal and state governments of that reform, the political representatives of the relatively poor West German states managed to forge a successful coalition with the representatives of the East German states. This is consistent with the observation that all relatively poor West German states fall into the categories of small and city states (see table 9) and that the bargaining power of these states in the Upper House of Germany's parliament (Bundesrat) is larger than that of the large West German states (Pitlik et al., 2001). Table 9 illustrates this point by reporting the number of seats the individual states have in the Bundesrat. Of the total of 67 seats, 23 are for East German states, 18 for the West German states that are typically net receivers in LFA (Bremen, Lower Saxony, Rhineland-Palatinate, Saarland, and Schleswig-Holstein), and the remaining 26 belong to the West German states that are typically net contributors (Baden-Württemberg, Bavaria, Hamburg, Hesse, and North-Rhine Westfalia.)

Recent research on the stabilizing functions of fiscal equalization was stimulated by the creation of a monetary union in Europe. A common argument in the debate over EMU has been that the monetary union needs a mechanism for paying transfers between member states in different stages of the business cycle. Our empirical results suggest that the stabilization of state disposable incomes provided by the horizontal transfers among the states of Germany is rather limited. Most of the stabilization achieved by fiscal equalization in Germany comes from transferring tax revenues from the states to the federal government. Since Europe does not have a government of a size comparable to today's national governments, that is hardly an option for EMU. Germany's example suggests that horizontal fiscal equalization alone is not a promising alternative, and may not be a politically viable option in any case. Since, in the case of the EU, fiscal equalization would necessarily be negotiated among the governments of the member states, the German example also warns that the outcomes of such negotiations may serve the interests of the policymakers involved more than the goal of macroeconomic stabilization originally intended.

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Tables

Table 1: Basic Statistics 1970-1994.

Year	Variable	Average	Std. Dev.	Minimum	Maximum
1970	**Gross Domestic Product**	12,942	2,044	10,674	22,174
	Net national income	10,177	1,550	8,228	16,983
	Total tax revenue	2,930	1,496	1,997	10,735
	VAT transfer	-3.71	117.44	-502.43	184.34
	State-to-state transfers	0.00	63.28	-204.22	152.91
	Federal grants	1.98	2.75	0.00	7.57
1980	**Gross Domestic Product**	16,711	2,418	14,222	28,444
	Net national income	12,892	1,799	10,892	20,902
	Total tax revenue	4,166	1,825	2,746	14,200
	VAT transfer	-6.46	152.47	-784.65	143.11
	State-to-state transfers	0.00	69.95	-136.42	186.09
	Federal grants	16.01	21.32	0.00	55.93
1990	**Gross Domestic Product**	20,300	3,083	16,876	33,441
	Net national income	15,694	2,461	13,055	25,468
	Total tax revenue	4,530	1,771	2,802	13,533
	VAT transfer	-8.72	203.01	-599.34	278.52
	State-to-state transfers	0.00	105.78	-135.13	497.33
	Federal grants	26.01	47.41	0.00	199.36
1994	**Gross Domestic Product**	20,836	3,208	17,230	34,867
	Net national income	15,631	2,580	12,567	25,823
	Total tax revenue	5,115	2,057	3,412	16,688
	VAT transfer	-114.94	217.31	-1,023.35	119.33
	State-to-state transfers	0.00	71.51	-142.63	389.47
	Federal grants	53.12	183.66	0.00	1,435.81

Notes: All values in the table are per capita values in *constant 1991 Euros*. Average values are calculated as averages weighted by respective state population. *Total tax revenue* refers to the sum of federal, state, and local taxes with tax incidence within a state's borders.

Table 2: Basic Statistics, Germany 1995-2006.

Year	Variable	Average	Std. Dev.	Minimum	Maximum
1995	**Gross Domestic Product**	19,876	4,661	10,641	34,144
	Net national income	15,018	3,056	8,310	19,471
	Total tax revenue	4,473	2,365	1,143	17,101
	VAT transfer	-19.30	382.58	-1,282.29	713.62
	State-to-state transfers	-5.19	157.65	-163.71	539.72
	Federal grants	127.76	222.21	0.00	1,425.11
2000	**Gross Domestic Product**	21,818	5,185	12,169	37,108
	Net national income	16,123	3,344	8,743	20,723
	Total tax revenue	5,317	2,664	1,420	18,812
	VAT transfer	-55.63	536.61	-1,768.98	880.90
	State-to-state transfers	-7.61	228.42	-402.51	710.22
	Federal grants	130.48	209.40	0.00	1,325.25
2006	**Gross Domestic Product**	23,050	5,350	13,492	38,581
	Net national income	17,400	3,726	9,344	23,410
	Total tax revenue	5,207	2,354	1,540	16,965
	VAT transfer	-48.29	531.84	-2,156.43	845.41
	State-to-state transfers	-6.87	200.62	-326.69	629.58
	Federal grants	130.07	240.65	0.00	670.25

Notes: All values in the table are per capita values in *constant 1991 Euros*. Average values are calculated as averages weighted by respective state population. *Total tax revenue* refers to the sum of federal, state, and local taxes with tax incidence within a state's borders.

Table 3: Basic Statistics 1995-2006, East German States.

Year	Variable	Average	Std. Dev.	Minimum	Maximum
1995	**Gross Domestic Product**	12,981	3,489	10,641	19,981
	Net national income	9,817	2,274	8,310	14,364
	Total tax revenue	1,933	1,172	1,143	4,277
	VAT transfer	537.42	250.62	42.51	713.62
	State-to-state transfers	228.91	153.93	132.48	539.72
	Federal grants	416.20	31.66	386.92	476.09
2000	**Gross Domestic Product**	14,078	2,833	12,169	19,794
	Net national income	10,243	1,746	8,743	13,714
	Total tax revenue	2,159	1,029	1,420	4,211
	VAT transfer	671.08	308.51	54.47	880.90
	State-to-state transfers	300.30	202.43	183.40	710.22
	Federal grants	427.31	35.23	391.08	493.00
2006	**Gross Domestic Product**	15,087	1,919	13,492	18,726
	Net national income	10,707	1,185	9,344	12,930
	Total tax revenue	2,319	1,104	1,540	4,483
	VAT transfer	600.81	239.02	150.14	845.41
	State-to-state transfers	271.06	181.68	164.24	629.58
	Federal grants	603.08	42.13	532.87	670.25

Notes: All values in the table are per capita values in *constant 1991 Euros*. Average values are calculated as averages weighted by respective state population. *Total tax revenue* refers to the sum of federal, state, and local taxes with tax incidence within a state's borders. The sample consists of the 5 East German states and Berlin.

Table 4: Basic Statistics 1995-2006, West German States.

Year	Variable	Average	Std. Dev.	Minimum	Maximum
1995	**Gross Domestic Product**	21,780	2,757	18,551	34,144
	Net national income	16,455	978	13,550	19,471
	Total tax revenue	5,174	2,118	3,428	17,101
	VAT transfer	-173.08	245.34	-1,282.29	100.00
	State-to-state transfers	-69.85	76.50	-163.71	377.35
	Federal grants	48.09	182.80	0.00	1,425.11
2000	**Gross Domestic Product**	23,879	3,421	19,766	37,108
	Net national income	17,689	1,300	15,535	20,723
	Total tax revenue	6,159	2,310	3,688	18,812
	VAT transfer	-249.15	401.50	-1,768.98	253.08
	State-to-state transfers	-89.61	152.26	-402.51	594.66
	Federal grants	51.43	159.63	0.00	1,325.25
2006	**Gross Domestic Product**	25,074	3,840	20,410	38,581
	Net national income	19,101	1,667	16,608	23,410
	Total tax revenue	5,942	1,995	3,904	16,965
	VAT transfer	-213.28	453.78	-2,156.43	311.97
	State-to-state transfers	-77.52	132.14	-326.69	513.78
	Federal grants	9.83	29.17	0.00	242.81

Notes: All values in the table are per capita values in *constant 1991 Euros*. Average values are calculated as averages weighted by respective state population. *Total tax revenue* refers to the sum of federal, state, and local taxes with tax incidence within a state's borders. The sample consists of the 10 West German states (excluding Berlin).

Table 5A: Redistribution of state income in Germany, 1970-2006.

Dependent variable	West Germany 1970-1994		Germany 1995-2006	
State disposable income after …	**1-β_d**	**adj. R^2**	**1-β_d**	**adj. R^2**
... transfer of federal tax share	0.314	0.98	0.25	0.92
	(0.036)***		(0.107)***	
+ VAT redistr. among states	0.356	0.98	0.344	0.89
	(0.037)***		(0.110)***	
+ state-to-state transfers	0.366	0.97	0.36	0.89
	(0.040)***		(0.110)***	
+ federal grants	0.369	0.97	0.386	0.88
	(0.041)***		(0.108)***	

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.
The standard errors in parentheses pertain to β_d. Constants are not reported. 1970-1994: 10 observations; 1995-2006: 16 observations. The regression equation is equation (2) in the text.

Table 5B: Redistribution of state income in Germany, 1995-2006.

Dependent variable State disposable income after …	West Germany 1995-2006 $1\text{-}\beta_d$	adj. R^2	East Germany 1995-2006 $1\text{-}\beta_d$	adj. R^2
... transfer of federal tax share	0.511 (0.047)***	0.91	0.139 (0.016)***	0.99
+ VAT redistr. among states	0.606 (0.053)***	0.80	0.283 (0.016)***	0.99
+ state-to-state transfers	0.618 (0.053)***	0.81	0.232 (0.015)***	0.99
+ federal grants	0.63 (0.055)***	0.77	0.252 (0.015)***	0.99

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.
The standard errors in parentheses pertain to β_d. Constants are not reported. 1995-2006: 10 obs. (West), 6 obs. (East). The regression equation is equation (2) in the text.

Table 6A: Stabilization of state income in Germany, 1970-2006.

Dependent variable	West Germany 1970-1994					Germany 1995-2006				
State disposable income after…	**pooled**	**large †**	**small**	**city**	**adj. R^2**	**pooled**	**large †**	**small**	**city**	**adj. R^2**
... transfer of federal tax share	0.348 (0.196)***				0.59	0.081 (0.081)***				0.89
		-0.098 (0.041)***	0.362 (0.210)	0.836 (0.107)***	0.81		0.07 (0.098)***	-0.012 (0.117)	0.023 (0.160)	0.89
+ VAT redistr. among states	0.381 (0.211)**				0.52	0.159 (0.120)***				0.83
		-0.11 (0.047)***	0.514 (0.307)	0.895 (0.101)***	0.76		0.102 (0.121)***	0.032 (0.152)	0.079 (0.225)	0.83
+ state-to-state transfers	0.45 (0.227)**				0.43	0.18 (0.127)***				0.81
		-0.074 (0.048)***	0.486 (0.305)	0.968 (0.104)***	0.74		0.174 (0.138)***	-0.031 (0.164)	0.023 (0.243)	0.81
+ federal grants	0.467 (0.236)**				0.38	0.194 (0.126)***				0.74
		-0.067 (0.049)***	0.46 (0.310)	0.994 (0.130)***	0.67		0.167 (0.136)***	0.14 (0.189)	-0.017 (0.232)	0.74

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. The clustered standard errors in parentheses pertain to β_s. 1970-1994: 250 observations; 1995-2006: 192 observations.
The regression equation is equation (3) in the text and a modification where the RHS variable is interacted with dummies for small and city states.
† In this column, we report the coefficient estimate (1- β_s) of the stabilization effect of the fiscal system on state income for a large state, the omitted state size category in the regression. The reported coefficient in the small (city) column represents the differential for small (city) states to the stabilization effect in large states (in the *large* column). For example, the stabilization effect for a small state would be the sum of the coefficients in the *large* and *small* column.

Table 6B: Stabilization of state income in Germany, 1995-2006. With interactive dummies for state size.

Dependent variable **State disposable income after …**	**West Germany 1995-2006**					**East Germany 1995-2006**			
	pooled	**large †**	**small**	**city**	**adj. R^2**	**pooled**	**small states ‡**	**Berlin**	**adj. R^2**
... transfer of federal tax share	0.162 (0.087)***				0.85	0.025 (0.016)***			0.96
		0.044 (0.089)***	-0.014 (0.112)	0.27 (0.093)**	0.88		0.053 (0.064)***	-0.038 (0.064)	0.96
+ VAT redistr. among states	0.276 (0.134)***				0.76	0.099 (0.014)***			0.96
		0.058 (0.106)***	0.036 (0.151)	0.445 (0.124)***	0.83		0.119 (0.060)***	-0.027 (0.060)	0.96
+ state-to-state transfers	0.307 (0.137)***				0.73	0.127 (0.014)***			0.96
		0.124 (0.121)***	-0.022 (0.158)	0.418 (0.134)**	0.80		0.148 (0.058)***	-0.029 (0.058)	0.96
+ federal grants	0.311 (0.146)***				0.59	0.141 (0.014)***			0.96
		0.121 (0.130)***	0.199 (0.212)	0.252 (0.280)	0.59		0.161 (0.057)***	-0.027 (0.057)	0.96

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. The clustered standard errors in parentheses pertain to βs. 1995-2006: 120 observations (West); 72 observations (East).
The regression equation is equation (3) in the text and a modification where the RHS variable is interacted with dummies for small and city states. † In this column, we report the coefficient estimate of the stabilization effect (1- β_s) of the fiscal system on state income for a large state, the omitted state size category in the regression. The reported coefficient in the small (city) column represents the differential for small (city) states to the stabilization effect in large states (in the *large* column). For example, the stabilization effect for a small state would be the sum of the coefficients in the *large* and *small* column.
‡ This captegory includes all East German states except Berlin.

Table 7A: Redistribution of state tax revenue in Germany. 1970-2006.

Dependent variable	West Germany 1970-1994		Germany 1995-2006	
State tax revenue after …	**1-β_d**	**adj. R^2**	**1-β_d**	**adj. R^2**
... transfer of federal tax share	0.589 (0.023)***	0.95	0.407 (0.083)***	0.87
+ VAT redistr. among states	0.74 (0.016)***	0.93	0.729 (0.042)***	0.80
+ state-to-state transfers	0.775 (0.023)***	0.90	0.774 (0.039)***	0.73
+ federal grants	0.716 (0.026)***	0.89	0.783 (0.069)***	0.56

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.
The robust standard errors in parentheses pertain to β_d. Constants are not reported. 1970-1994: 10 observations; 1995-2006: 16 observations. The regression equation is equation (2) in the text.

Table 7B: Redistribution of state tax revenue in Germany, 1995-2006.

Dependent variable	West Germany 1995-2006		East Germany 1995-2006	
State tax revenue after …	**$1-\beta_d$**	**adj. R^2**	**$1-\beta_d$**	**adj. R^2**
... transfer of federal tax share	0.541 (0.021)***	0.94	0.094 (0.026)***	0.98
+ VAT redistr. among states	0.786 (0.011)***	0.79	0.759 (0.013)***	0.94
+ state-to-state transfers	0.807 (0.012)***	0.75	0.604 (0.021)***	0.94
+ federal grants	0.892 (0.014)***	0.60	0.678 (0.016)***	0.95

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.
The robust standard errors in parentheses pertain to β_d. Constants are not reported. 1995-2006: 10 obs. (West), 6 obs. (East).
The regression equation is equation (2) in the text.

Table 8A: Stabilization of state tax revenue in Germany. 1970-2006.

Dependent variable	West Germany 1970-1994					Germany 1995-2006				
State tax revenue after …	**pooled**	**large †**	**small**	**city**	**adj. R^2**	**pooled**	**large †**	**small**	**city**	**adj. R^2**
... transfer of federal tax share	0.63				0.52	0.397				0.52
	(0.064)***					(0.056)***				
		0.276	0.121	0.401	0.57		0.23	-0.024	0.214	0.53
		(0.145)***	(0.160)	(0.151)**			(0.217)***	(0.250)	(0.219)	
+ VAT redistr. among states	0.788				0.32	0.841				0.12
	(0.031)***					(0.065)**				
		0.6	0.351	0.178	0.34		0.532	0.333	0.338	0.15
		(0.183)*	(0.183)*	(0.185)			(0.050)***	(0.157)*	(0.075)***	
+ state-to-state transfers	0.962				0.02	0.937				0.03
	(0.010)***					(0.021)**				
		0.753	0.191	0.221	0.05		0.795	0.094	0.165	0.05
		(0.099)**	(0.099)*	(0.099)*			(0.053)***	(0.111)	(0.053)***	
+ federal grants	1.026				0.01	0.867				0.11
	(0.04)**					(0.041)***				
		0.84	0.214	0.192	0.02		0.846	-0.053	0.034	0.11
		(0.267)	(0.269)	(0.270)			(0.116)	(0.157)	(0.123)	

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. The clustered standard errors in parentheses pertain to β_s. 1970-1994: 250 observations; 1995-2006: 192 observations. The regression equation is equation (3) in the text and a modification where the RHS variable is interacted with dummies for small and city states.

† In this column, we report the coefficient estimate of the stabilization effect (1- β_s) of the fiscal system on state tax revenue for a large state, the omitted state size category in the regression. The reported coefficient in the small (city) column represents the differential for small (city) states to the stabilization effect in large states (in the *large* column). For example, the stabilization effect for a small state would be the sum of the coefficients in the *large* and *small* column.

Table 8B: Stabilization of state tax revenue in Germany, 1995-2006.

Dependent variable State tax revenue after …	West Germany 1995-2006 pooled	large †	small	city	adj. R^2	East Germany 1995-2006 pooled	small states ‡	Berlin	adj. R^2
... transfer of federal tax share	0.376 (0.068)***				0.60	0.686 (0.089)**			0.12
		0.2 (0.225)***	-0.135 (0.255)	0.228 (0.228)	0.61		0.788 (0.140)	-0.173 (0.140)	0.12
+ VAT redistr. among states	0.831 (0.075)*				0.14	0.921 (0.022)**			0.09
		0.428 (0.044)***	0.362 (0.232)	0.443 (0.070)***	0.19		0.933 (0.047)	-0.019 (0.047)	0.07
+ state-to-state transfers	0.935 (0.031)*				0.05	0.947 (0.010)***			0.04
		0.701 (0.083)***	0.125 (0.176)	0.268 (0.083)**	0.11		0.944 (0.024)*	0.005 (0.024)	0.02
+ federal grants	0.891 (0.020)***				0.12	0.692 (0.111)**			0.25
		0.812 (0.146)	-0.022 (0.198)	0.098 (0.146)	0.13		0.834 (0.156)	-0.242 (0.156)	0.28

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. The clustered standard errors in parentheses pertain to β_s. 1995-2006: 120 observations (West); 72 observations (East).
The regression equation is equation (3) in the text and a modification where the RHS variable is interacted with dummies for small and city states.
† In this column, we report the coefficient estimate of the stabilization effect (1- β_s) of the fiscal system on state tax revenue for a large state, the omitted state size category in the regression. The reported coefficient in the small (city) column represents the differential for small (city) states to the stabilization effect in large states (in the *large* column). For example, the stabilization effect for a small state would be the sum of the coefficients in the *large* and *small* column.
‡ This category includes all East German states except Berlin.

Table 9: Sample States

West Germany				**East Germany**			
state	***fiscal capacity***	***Seats in Bundesrat***	***Relative Representation***	***state***	***fiscal capacity***	***Seats in Bundesrat***	***Relative Representation***
Baden-Wuerttemberg	2	6	0.69	Berlin (C)	16	4	1.39
Bavaria	4	6	0.59	Brandenburg (S)	10	4	1.85
Bremen (C)	15	3	5.32	Mecklenburg-Vorpommern (S)	14	3	1.98
Hamburg (C)	3	3	2.10	Saxony (S)	11	4	1.05
Hesse	1	5	0.95	Saxony-Anhalt (S)	12	4	1.76
Lower Saxony	7	6	0.91	Thuringia (S)	13	4	1.92
North Rhine Westphalia	5	6	0.40				
Rhineland-Palatinate (S)	8	4	1.19				
Saarland (S)	9	3	3.32				
Schleswig-Holstein (S)	6	2	1.75				

Note: C = city state, S = small state: all other states are classified as large states.
Fiscal capacity indicates the state's rank in fiscal capacity in 1998 (Source: Spahn, 2000, and Deutscher Bundesrat Website).
Relative representation indicates the number of seats in the Upper House of parliament (Bundesrat) per state resident normalized by the number of seats relative to the total population.
Source: Pitlik (2004).

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