Challenges of Fiscal Federalism

The Fiscal Effects of Equalization, Credit Access and Transfer Dependency

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Chapter 1

Introduction

One of the great benefits of fiscal federalism is that it enables an ongoing quest for optimal policy solutions. "Laboratory federalism" (see Oates 2008, p. 236) facilitates simultaneous experimentation with competing policy ideas within a country. The way the federal states organize local public finance in Germany is such a case of diverse policy choices within a common overarching framework. Municipal fiscal equalization, transfer dependency and credit access are prime examples of Germany's multi-level fiscal structure: At first glance, common rules and parallel structures dominate. Beneath the surface lie intricate policy differences that make these three overlapping areas of the fiscal landscape worth studying.

This dissertation aims, first, to show empirically that variation in state policies towards municipalities translates into different fiscal outcomes at the municipal level, and second, to arrive at meaningful policy implications from these outcomes. In order to lay the ground for the empirical analysis, we first need to familiarize ourselves with the institutional characteristics of local public finance in Germany. This is done in the following section. However, the institutional detail on Germany presented in this dissertation should not cloud its relevance beyond Germany. The lessons derived here are important for any federal and any fiscally decentralized country. They are also relevant for the future of the European Union (EU). If fiscal integration advances in the EU, common pitfalls of fiscal federalism should be avoided. Only then can we hope that fiscal federalism does not just bring intergovernmental complexity but also delivers what it is meant to deliver: Greater responsiveness to citizens' diverse preferences as well as greater efficiency and accountability in the public sector.

After giving some essential institutional background (Section 1.1), this introduction provides an overview of the dissertation (Section 1.2), followed by a summary of each chapter (Section 1.3).

1.1 Local public finance in Germany

Germany is divided into more than 11,000 municipalities. They constitute the lowest administrative and fiscal layer beneath the federal level and the 16 federal states (three city-states and 13 territorial states). Each level has a differing degree of autonomy over their spending and revenue raising activities, which is in large part enshrined in the national constitution. The constitution grants municipalities "the right to regulate all local affairs on their own responsibility" (Art. 28 II GG), which encompasses autonomy on the revenue and spending side.

Local revenue sources. German municipalities draw revenue from three main sources: Taxes, fees and charges, and transfers from higher levels of government. Art. 28 II GG specifies that the guarantee of local self-government extends "to the bases of financial autonomy", which include "a source of tax revenues based upon economic ability and the right to establish the rates at which these sources shall be taxed". Art. 106 GG further specifies the division of tax revenues between the federal layers of government and the tax sources to be assigned to municipalities. There are two major municipal taxes: The property and the business tax. While the tax bases for both of them are defined at the federal level, their tax rates are set locally. Tax revenue from property taxation fully accrues to the municipalities. In contrast, the federal level and the states receive part of the business tax revenue through an apportionment. The property tax can be considered a "typical" local tax. The suitability of the business tax for the local level is more disputable given the mobility and volatility of its tax base. Hence, its assignment to the local level is unusual. Local tax autonomy and especially the German particularity of local business tax autonomy is a recurring theme in this dissertation.

In addition, municipalities can set and collect local excise and consumption taxes. They may also introduce new excise taxes as long as they are not comparable to existing federal taxes. However, revenue from excise and consumption taxes remains negligible relative to the business and property tax. Finally, municipalities receive 15 percent of national income tax revenue as well as 2.2 percent of national VAT revenue. The distribution

of income tax and VAT revenue among individual municipalities is governed by federal law. The rest is distributed among the federal level and the states. Municipalities do not have authority over tax bases or tax rates of these shared taxes.

Fees and charges are levied by municipalities for their services such as waste management or childcare services. Revenue from fees and charges must not exceed and is supposed to cover the costs caused by the provision of the services for which they are raised.

Transfers from higher levels of government, i.e. state governments, constitute the final local revenue source. The federal constitution does not allow any direct financial flows from the federal to the local level. Hence, although the federal government has become increasingly more involved in financing local tasks, any federal financial assistance must be channeled through state budgets. Each federal state determines how grants are to be distributed among its municipalities. Transfers from state to local governments take different forms. In particular, they can be unconditional or tied to specific spending purposes. The majority of transfers is unconditional and paid out as part of municipal fiscal equalization systems.

Municipal fiscal equalization schemes exist in all 13 territorial states. They all operate according to the same basic principles: Municipalities whose fiscal need exceeds their fiscal capacity shall receive a transfer payment, which partially closes the gap. Equalization transfers thus serve an essential financing function, since most municipalities are unable to meet their financial obligations without state assistance. At the same time, they serve an equalizing function. All municipalities shall be enabled to provide a comparable level of local goods and services, as mandated by the national constitution. The dependence of local governments on transfers from higher government levels and the design of transfer schemes are another theme of this dissertation.

Local public debt can also be considered part of local revenues. However, debt for investment and consumption purposes needs to be distinguished. Legally, municipalities may go into debt only for investment purposes, i.e. for financing investment, investment assistance, or debt restructuring. Municipal debt to finance consumption is ruled out by state law in all federal states. This seemingly stringent rule is complicated in practice by the existence of so-called liquidity credits that are meant to fill temporary liquidity gaps until “real” revenues become available. State regulation on municipal liquidity credits varies. Depending on state oversight, the (mis-)use of liquidity credits may open an avenue for regular municipal current deficits. Municipal fiscal performance in terms of

local budget balances and effective local credit access are additional guiding elements of this dissertation.

Local spending responsibilities. The constitution guarantees municipalities the right to regulate their own affairs independently. As such, they are free, within the boundaries of the law, to define their own tasks. However, the federal and state level can mandate particular local tasks or define standards that municipalities must meet in the provision of local public goods and services. They can also delegate their own tasks to the local level. Accordingly, local government functions and corresponding spending activities take three forms. First, there are voluntary local tasks. Municipalities can decide if and how to fulfill them. Typical examples include the provision of cultural services, sports grounds or youth centers. Second, there are mandatory local tasks. Municipalities are obliged to fulfill these tasks. They may decide on their own how to fulfill them, but often need to respect minimum standards defined by higher levels of government. The provision of schools, local public roads or sewage disposal are examples of such tasks. Finally, there are delegated tasks. Municipalities participate in the provision of federal or state services. The latter are fully defined by the delegating level of government. The provision of passports to citizens is such a task; it is carried out by municipalities as mandated by the federal level. Over the past decades, higher levels of government have increasingly intruded into local government in Germany. While standards for the provision of local services have increased and more and more tasks have been devolved to the local level, the provision of adequate local financing has often lagged behind, causing financial trouble at the municipal level.[1] The potential mismatch of local spending and revenues will also come up repeatedly in this dissertation, as will the question of what constitutes "adequate" local financing.

State influence on local public finance. The (fiscal) interaction between the state and municipal level is another central theme of this dissertation. The states exert substantial influence on local public finance through multiple channels that have already been alluded to in the previous paragraphs.

Through their fiscal equalization schemes, states have great power over the financial position of their municipalities. The design of these schemes is a state responsibility. When parameters within the scheme are altered, the local fiscal situation and local fiscal policy are affected. Transfers outside equalization systems also affect local finances. They may

[1] From my experience as a public policy consultant, I know that municipalities often deem their financial resources inappropriate. State governments might of course disagree.

be unconditional or conditional and they may or may not have a matching requirement – all of this affects local incentives.

A more obvious channel of state influence is regulatory control.[2] States are responsible for ensuring that municipalities act within the boundaries of the law. Budgetary oversight is perhaps the most important component of state regulatory control. All states impose similar rules on municipal budgets through their local government laws, in particular balanced budgets and constraints on local debt. But they have a lot of discretion when it comes to reacting to rule breaches. Hence, the effectiveness of state monitoring of local fiscal positions differs, as does the degree of de facto local credit rationing. State fiscal control involves a trade-off between local fiscal sustainability and budgetary flexibility of local governments.

Finally, states have decisive influence over the amount of tasks municipalities are obliged to handle. They can assign tasks to the local level and delegate their own tasks to municipalities. Therefore, the effective degree of fiscal decentralization varies across states. In general, municipalities in the Old Länder have a greater share in total local and state government spending than their counterparts in the New Länder, with corresponding greater access to financial resources.

1.2 Research questions and chapter overview

German municipalities enjoy tax autonomy, most importantly over business and property taxation. However, tax revenue along with revenue from fees and charges is typically far from sufficient to cover rising spending needs. How should the gap be filled? How do different types of local revenue sources impact fiscal outcomes? How does the system of local public finance in turn influence local tax policy? These are some of the key questions of this dissertation. The dissertation's three chapters are self-contained papers. In the following, I give a brief overview of the chapters and how they relate to each other.[3]

All chapters belong to the field of applied economic literature on German municipalities, exploring challenges that arise from fiscal federalism in Germany. They study the local level to derive lessons on policies that are decided upon at the state level or

[2]Counties, which themselves are part of the municipal level, are the competent regulatory authority for the municipalities that belong to them. State interior ministries or intermediate state agencies exercise oversight over counties and cities with county status.

[3]See Section 1.3 for a more detailed and systematic summary of each chapter.

even the federal level. While the focus of this dissertation is firmly empirical, all chapters have a grounding in economic theory, applying fundamental economic concepts to German municipalities. Thus, the motivation for Chapter 2 comes from the "race to the bottom" hypothesis and the common-pool literature. The latter is also a central starting point for Chapter 3, which additionally builds on the flypaper and soft budget constraint literature, inter alia. Chapter 4 investigates Barro's (1979) tax smoothing hypothesis.

All chapters make use of empirical, administrative data on German municipalities. Each chapter is based on a different (but overlapping) dataset that we built from various official data sources. In particular, we drew data from the Regional Database Germany (*Regionaldatenbank Deutschland*), the Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder (*Forschungsdatenzentren der Statistischen Ämter des Bundes und der Länder*) and the Statistics Local publications (*Statistik Lokal*). Supplementary data came from the Federal Statistical Office (*Statistisches Bundesamt*), the Federal Employment Agency (*Bundesagentur für Arbeit*) and individual state statistical offices. The resulting database features a range of demographic, socioeconomic and political indicators for individual municipalities, counties and states. Two chapters (Chapter 3 and 4) work with data on all of Germany (with the exception of the city-states), while the remaining chapter (Chapter 2) studies municipalities in the most populous state North Rhine-Westphalia. The chapters predominantly rely on the econometric analysis of panel data. This data structure allows the use of fixed effects to control for any time-invariant, municipality-specific omitted variables (see, e.g., Wooldridge [2011]).

Chapter 2 starts by tackling municipal fiscal equalization. Municipal fiscal equalization schemes exist in all German territorial states. The transfers provided through these schemes are an essential pillar of local revenue. Equalization schemes aim to reduce differences in the financial capacity of municipalities without distorting their fiscal choices. Yet it is an unspoken truth among political practitioners that the design of equalization schemes does have an impact on local fiscal policy. Chapter 2 demonstrates such an impact using the example of standard tax multipliers in North Rhine-Westphalia. It shows that standard tax multipliers can be used to trigger adjustments of local business tax rates and to avoid a race to the bottom. At the same time, they may become a threat to state competitiveness if they lead to upward spirals in tax rates instead.

The results of Chapter 2 seem to suggest that transfers to lower levels of government are unequivocally beneficial, if they are designed well. This assessment requires some qualifications, as shown in Chapter 3. Fiscal equalization transfers are not the only types

of transfers municipalities receive from the state level, nor is the influence of state transfers limited to tax policy. There is a bigger system of transfers, which includes shared taxes, conditional and unconditional transfers. Chapter 3 looks at all of these transfers, both as a whole and separately. It investigates whether there is a relationship between the degree of municipal transfer dependency and municipal fiscal performance as evidenced by the budget balance. The findings point to an adverse effect of reliance on transfers. In turn, fiscal performance is better the bigger the share of own-source revenue in the local revenue mix. As discussed in Chapter 3, the negative impact of transfer dependency is contingent on a number of other factors, inter alia on local borrowing autonomy. Formally, municipal credit access for financing current spending is prohibited in all German states. However, actual credit access differs in practice. The local budget balance suffers when transfer dependency and local borrowing autonomy coincide.

Thus, local borrowing autonomy is not an ideal institutional choice when it comes to local fiscal performance. However, credit access gives municipalities more flexibility in handling spending pressure. Economic theory even suggests that it could be beneficial for local tax policy as it could enable municipalities to smooth tax rates over time. This would reduce the deadweight loss from taxation. Chapter 4 shows that such a beneficial side effect of local credit access cannot be identified. In fact, empirical analysis points in the opposite direction: More credit access is associated not with smoother, but with more volatile local business and property tax rates. Granting municipalities credit access may lead to unsustainable fiscal behavior. Ultimately, calls for bailouts become more likely when municipalities can go into debt for current purposes. Thus, the problems created by transfer dependency are indeed worsened by local credit access.

Where does this leave us? Chapter 4 concludes that in face of rising spending pressures, granting municipalities access to credit is not advisable. It lead to more fiscal pressure down the road. Instead, one of the main insights of Chapter 4 is that effective monitoring by state governments of local fiscal positions with the imposition and enforcement of clear rules is decisive in ensuring long-run fiscal sustainability at the local level. Lack of effective oversight may facilitate unsustainable debt build-up. The results of Chapter 3 indicate that an increase of transfers would not be recommendable either. Nor would it be feasible as states whose municipalities are in fiscal distress typically struggle with fiscal woes themselves.

Revisiting local spending responsibilities is one option for restoring local fiscal sustainability where it is threatened. This applies in particular to local spending that is due

to delegated and strongly regulated tasks where any benefits of letting municipalities carry out these functions are questionable.

Letting municipalities raise more own revenue is another option. It could reduce local financing gaps, lead to more accountability and ultimately to more sustainable local public finances. Yet there are institutional obstacles to more local own revenue: Given that the federal tax structure is determined in the constitution, there is only limited scope to increase the level of own revenues municipalities have access to. Municipalities do have the right to raise local excise or consumption taxes, but they must not be comparable with existing federal taxes. In addition to this significant constraint, state regulations further limit the right to raise local taxes. Most state laws require new municipal taxes to be approved by the state level, with approval often being denied (Rehm and Matern-Rehm 2010, p. 130). Perhaps it is time to encourage municipalities instead to make more use of their constitutionally guaranteed right.[4] After all, local excise taxes are often ideal local taxes. They satisfy the equivalence principle, according to which taxes should be a reflection of the goods and services provided by the government. The more services a municipality provides or the better their quality, the more its citizens should be asked to pay in taxes. When finding new innovative tax bases, attention should be paid to keep distortions to a minimum.

Granting municipalities more rights with respect to local tax autonomy does not mean states cannot influence local tax policy. As demonstrated in Chapter 2, municipal fiscal equalization schemes contain powerful tools for shaping local tax policy, in addition to budgetary monitoring and regulatory control. Fiscal equalization is essential in order to provide municipalities with much-needed financial resources. At the same time, fiscal equalization is not neutral with respect to local policy: It creates direct incentives for the choice of appropriate local tax rates, local tax effort and beyond. Through their municipal fiscal equalization schemes, states can set the direction of local tax policy, influence the general level of tax rates within the state and, through this, impact the competitiveness of the state as a whole. This in turn affects how much revenue municipalities can generate from local taxes, as opposed to transfers from above, and how easily they can balance their budgets.

[4] Art. 105 IIa GG grants the states the power to legislate with regard to local excise and consumption taxes, which they deferred to municipalities.

1.3 Chapters and main findings

This section presents a systematic overview of the chapters comprising this dissertation. After providing information on co-authorship where applicable, the research question, main hypotheses, related literature, methodology, key findings and policy implications are summarized for each chapter.

1.3.1 Chapter 2: How to stop the race to the bottom

Chapter 2 is the result of joint work with Anna Rauch. It was published as "How to stop the race to the bottom. Empirical evidence from North Rhine-Westphalia" in International Tax and Public Finance (Rauch and Hummel 2015).

Research question. Chapter 2 investigates the role of standard tax multipliers in shaping local tax policy. Standard tax multipliers are a widespread feature of fiscal equalization systems. They are employed to calculate the fiscal capacity from taxes for which subnational governments enjoy tax autonomy. In the German context, they are used to normalize business and property tax revenue. If the municipality's actual tax multiplier is smaller than the standard tax multiplier, the accounted standardized tax revenue is greater than actual tax revenue (and vice versa). The chapter asks whether changes in standard tax multipliers translate into corresponding changes of local tax rates.

Main hypotheses. We hypothesize that local tax rates respond positively to changes in standard tax multipliers. This makes standard tax multipliers a tool through which federal states can influence local tax policy. In particular, it ensures that municipalities do not engage in a race to the bottom in business taxation and that they uphold an adequate amount of tax effort. While the effects of most mechanisms within the equalization system are unknown to the municipalities, the municipalities are well aware of the impact of the standard tax multiplier (i.e. the "overestimation" of tax revenue if the standard tax multiplier exceeds their tax multiplier). Standard tax multipliers prevent municipalities from neglecting their own tax sources. They provide a signal for an "appropriate" tax rate level, which municipalities are incentivized to follow in order to maximize their revenue. Thus, practitioners at the state level have devised a clever mechanism to circumvent common pitfalls of local tax policy.

Related literature. A growing body of literature investigates the incentive effects of equalization systems on tax policy. Köthenbürger (2002) shows that equalization

schemes that rely on revenue equalization tend to reinforce tax competition. In contrast, fiscal equalization in the form of tax base or capacity equalization increases subnational tax rates and thus attenuates competitive forces, which may be efficiency-enhancing when competition effects are strong enough (Köthenbürger 2002; Bucovetsky and Smart 2006; Smart 2007). Egger et al. (2010) exploit a change of the equalization formula in the state of Lower Saxony and show that this reform had a significant impact on municipalities' business tax rates for four consecutive years. Büttner (2006) provides evidence that there is a positive relationship between the marginal contribution rate, defined as the rate at which an increase in the tax base reduces equalization transfers, and local business tax rates in the state of Baden-Württemberg. Smart (2007) investigates the effect of equalization among Canadian provinces, showing that an expansion of transfers leads to higher provincial tax rates. In addition, the hypothesis of standard tax multipliers as a driver of local tax policy has long been discussed in the applied literature on the evaluation of and reform options for fiscal equalization systems (e.g., Büttner et al. 2008; Parsche and Steinherr 1995; Goerl et al. 2013). Baskaran (2014) even takes this hypothesis as a given in his analysis of local tax mimicking by municipalities in Germany. However, an explicit test of this hypothesis is absent from the academic literature to date.

Methodology. We adapt the theoretical models used in Smart (2007) and Egger et al. (2010) to illustrate the interaction of local taxation and fiscal equalization. This allows us to derive the optimal business tax multiplier as well as the incentive effect of a change in the standard business tax multiplier. The theoretical prediction is then put to an empirical test. A quasi-experiment in the state of North Rhine-Westphalia is exploited to identify the incentive effect. Until 1995, North Rhine-Westphalia's equalization scheme featured standard tax multipliers that were differentiated according to municipal population size. In 1993, the state constitutional court ruled that this arbitrary differentiation was not permissible. As a result, North Rhine-Westphalia's state legislature had to adjust its municipal fiscal equalization scheme. The court ruling thus led to exogenous variation in the standard tax multiplier for small municipalities. Our empirical analysis is based on a balanced panel dataset of annual administrative data for all 396 municipalities of North Rhine-Westphalia. The dataset covers the time period from 1987 to 2002, thereby containing information on the pre-reform, reform and post-reform periods. It draws on a variety of official statistics data sources. The rich and unique dataset includes a number of municipal and county-level control variables. Our research design combines a municipal-level fixed effects model with a difference-in-differences approach, where local business tax

multipliers are regressed on interaction terms between treatment groups and treatment points. Our identification strategy exploits the exogenous (quasi-experimental) variation of the standard tax multiplier for "small" municipalities induced by the reform of the North Rhine-Westphalian municipal fiscal equalization system in the mid-1990s.

Key findings. We find a positive effect of the standard business tax multiplier on local business tax multipliers, as predicted by theoretical considerations. Upward shifts in standard business tax multipliers lead to immediate upward adjustments in actual business tax multipliers. The effect is present for all affected municipalities, and it is more pronounced for those whose actual tax multipliers are initially below post-reform standard tax multipliers. The findings are robust to a number of alternative specifications.

Policy implications. Our results have important implications for the practical design of fiscal equalization schemes. They highlight the importance of the parameters of equalization systems for shaping local tax policy. Through its choice of the standard tax multiplier, a state can influence the level of municipal tax rates and the weight of competitive downward forces. Standard tax multipliers provide a straightforward practical tool for governments to shape lower-level tax policy, with important consequences for their own competitiveness.

1.3.2 Chapter 3: Does local transfer dependency weaken fiscal performance

Chapter 3 is sole-authored.

Research question. Chapter 3 asks whether dependency of local governments on transfers from higher levels of government negatively affects local fiscal outcomes.

Main hypotheses. The primary hypothesis guiding Chapter 3 is that lower transfer dependency improves fiscal performance and vice versa. Greater reliance on transfers from higher levels of government is expected to create soft budget constraints and lack of accountability at the municipal level, both of which contributes to bailout expectations. Because local governments expect to be bailed out by state governments should they run into fiscal difficulties, they have less incentive for sound fiscal management. Building on this hypothesis, the effect of transfer dependency on local fiscal performance might be contingent on other factors such as local borrowing autonomy, horizontal fiscal imbalances, election years or the degree of spending decentralization in the state in question. Finally, the effect of transfer dependency might differ depending on the type of trans-

fer. Shared taxes, conditional and unconditional transfers are all not own revenues. But the rules governing these transfers differ, which could imply different incentive effects for municipalities.

Related literature. A growing body of literature has demonstrated harmful effects of transfer dependency. Indeed, reliance on transfers as opposed to own revenues has been blamed for larger deficits (Eyraud and Lusinyan 2013; Foremny 2014; Rodden 2002; de Mello 2007), fiscal crises (Rodden et al. 2003), a lower GDP per capita (Blöchliger 2014), bigger government (Guo 2008), higher debt (Aldasoro and Seiferling 2014), lower government efficiency (Geys et al. 2010; Boetti et al. 2012), less skilled politicians (Bordignon et al. 2013) or even higher inequality (Hummel and Seiferling 2015). The existing empirical, quantitative literature shares a major potential flaw. It uses aggregate measures of subnational transfer dependency at the country level to test transfer dependency's empirical effect. Aggregating entire state or local sectors into one unit of analysis conceals a vast amount of within-country variation in vertical fiscal imbalance. Federal states in particular feature diverse institutional and fiscal landscapes that create such variation. As pointed out by Eyraud and Lusinyan (2013) and Rodden (2002), among others, using disaggregated data would therefore be desirable. Chapter 3 aims to fill this gap and to verify the results of the existing literature with an in-depth within-country econometric analysis.

Methodology. The theoretical hypotheses are tested in a disaggregated panel dataset comprising more than 5,000 German municipalities in all German states from 1998-2013. Local deficits are used as measures of fiscal performance. In the baseline regression model, municipal deficits per capita are regressed on municipal transfer dependency, defined as the share of transfers in gross current revenues, and controls. The baseline model relies on conventional fixed effects estimates. To rule out potential bias from endogeneity of the transfer dependency variable, the baseline results are verified using an innovative instrumental variable approach. The hypotheses concerning a contingent effect of transfer dependency on fiscal performance are tested by introducing interaction terms into the regression model. In addition to analyzing transfer dependency as a whole, the effect of different types of transfers – shared taxes, conditional and unconditional transfers – is considered separately.

Key findings. The empirical results confirm a negative impact of transfer dependency on the local budget balance. The effect is aggravated when transfer dependency coincides with horizontal fiscal imbalances or easy local access to borrowing. The decom-

posed analysis of dependency on different transfer types suggests that shared taxes and conditional transfers are responsible for the adverse budgetary effect, while reliance on unconditional transfers leaves local fiscal performance unaffected.

Policy implications. The findings suggest important policy implications. First, they bolster the oft-stated recommendation to accompany decentralization on the spending side with sufficient decentralization on the revenue side. Sound fiscal performance at the local level requires not only sufficient quantities of local revenue. It also requires the right kinds of local revenue. A substantial share of own revenues in the local revenue mix strengthens local legitimacy over the use of financial resources as well as local accountability, lessens bailout expectations and improves fiscal discipline. Second, to the extent that transfers to lower levels of government are required and might even need to be increased, attention should be paid to the choice of the transfer instrument. Too much emphasis on shared taxes and conditional transfers to fill local financing gaps might be particularly damaging in view of fiscal sustainability at the local level.

1.3.3 Chapter 4: Tax smoothing and credit access

Chapter 4 is co-authored with Anna Rauch and Eva Gerhards.

Research question. Are local tax rates less volatile if municipalities have easier access to credits? Do local governments smooth tax rates if they are granted access to borrowing? Economic theory shows that public debt can be useful to enhance social welfare if it enables governments to smooth taxes over time. Chapter 4 investigates the empirical relationship between credit access and tax smoothing using the case of German municipalities. If local tax rates are less volatile in federal states granting easier access to borrowing, there is some benefit to allowing public debt and a trade-off between tax smoothing and budget discipline arises. If not, local credit rationing is advisable.

Main hypotheses. It is plausible to assume that local governments that enjoy credit access find it easier to smooth taxes over time. They can afford to refrain from adjusting tax rates over the business cycle to ensure stable tax revenues. Allowing automatic stabilizers to work can easily cause deficits during economic downturns. The optimal response to adverse temporary economic shocks may also be to run a budget deficit rather than exacerbate economic costs through tax rate increases. Thus, we should see more stable tax rates in federal states where municipalities can make use of liquidity credits to

finance current deficits. In other words, there should be a positive link between credit access and tax smoothing, as credit access contributes to smoother tax rates.

Related literature. In his seminal contribution, Barro (1979) puts forward his theory of tax smoothing. From a welfare perspective, deadweight losses and hence tax rates should be smoothed over time in order to minimize distortionary costs from taxation. Credit rationing could inhibit tax smoothing. According to the standard recommendation of the fiscal federalism literature, lower levels of government should not be granted access to debt, at least not for financing current deficits (e.g., Oates 2005). However, ruling out debt finance could prevent subnational governments that enjoy tax autonomy over certain taxes from engaging in welfare-enhancing tax smoothing. Following the pioneering work of Barro (1979) and Bohn (1990), a sizable empirical and theoretical literature on tax smoothing developed. This literature typically asks whether governments do or do not engage in tax smoothing and finds answers using indirect tests of tax smoothing relying on the behavior of the budget balance. Examples include Adler (2006), Barro (1979; 1995), Bohn (1990), Olekalns (1997) and Strazicich (1997).

Methodology. We carry out an in-depth institutional analysis of local credit access in Germany, which yields an original credit access index. This index reflects the differing institutional, legal and administrative environment in each German territorial state. In addition, we define "smoother tax rates" as tax rates that are subject to a smaller number of changes within a given time period. Our approach allows us to use tax rate data and investigate tax rate volatility directly. This is in contrast to the indirect tax smoothing tests prevalent in existing literature.

We refute a positive association between credit access and tax smoothing for the case of German municipalities based on four steps of empirical, i.e. descriptive and econometric, analysis. First, we take a closer look at the development of liquidity credits. Next, we study tax rate volatility. Third, we show descriptively that a positive relationship exists between tax rate volatility and credit access. Fourth, we confirm the positive association between credit access and tax rate volatility using an econometric analysis where we regress tax rate volatility on credit access. The entire analysis is based on a dataset of over 10,000 municipalities in all German territorial states.

Key findings. We find no evidence in favor of a tax smoothing effect of credit access. Instead, we show that a rising number of German municipalities is making abusive use of easier credit access and carries a high burden of short-term debt. So-called liquidity credits that are meant to fill temporary liquidity gaps are increasingly used to cover persistent

budget deficits over a medium- to long-term horizon. Our results suggest that granting credit access is an (un)successful attempt of the respective federal states to compensate for insufficient revenues and to limit upward pressure on tax rates. Credit access triggers unsustainable behavior, making calls for bailouts more likely.

Policy implications. Our paper provides support for the notion that strict credit rationing of the local level may be the best institutional choice for higher-level governments even if there is substantial tax autonomy at the local level. Otherwise calls for bailouts become more likely. In Germany, federal states with loose attitudes towards local debt should then follow the example of states that never expanded local credit access in the first place. Making such a change would necessarily require revisiting local spending responsibilities and the adequacy of state transfers to the local level. Ensuring effective monitoring and budgetary oversight is also crucial. Beyond Germany, the findings of this paper suggest that higher-level governments should think twice before allowing subnational governments, and local governments in particular, access to credit to fund current expenditures. Chances are local debt will not be used in a welfare enhancing way.

Chapter 2

How to stop the race to the bottom

Abstract

Standard tax multipliers are a widespread feature of fiscal equalization systems. A simple theoretical model shows that actual tax multipliers respond positively to changes in standard tax multipliers. This theoretical prediction is tested empirically using data on municipalities in Germany. A quasi-experiment in the state of North Rhine-Westphalia is exploited to identify the incentive effect. The empirical results confirm that local business tax policy is shaped by standard tax multipliers. They provide a straightforward practical tool to avoid a race to the bottom in local business tax rates.

2.1 Introduction

It is a well-known normative principle among public economists that business taxation should not be decentralized to subnational levels of government. Otherwise, so the argument goes, local governments would engage in a harmful "race to the bottom" where they constantly try to undercut their neighbors' business tax rates. Resulting tax rates would be inefficiently low (Oates 1972). A similarly widespread insight is that problems of overspending and reduced tax effort arise whenever budgeting involves a common pool of resources (see Raudla [2010] for a review on the use of the "budgetary commons" metaphor in existing literature).

Germany's institutional setting involves business tax autonomy for local governments and a common pool of fiscal equalization transfers from the state to the local level. As a result, conventional wisdom points to overly low business tax rates as a likely outcome: Competition for mobile capital presumably pushes tax rates downwards. At the same

time, one might suspect that the common pool of equalization transfers further reduces tax effort. Indeed, Köthenbürger (2002) shows that equalization schemes that rely on revenue equalization tend to reinforce tax competition. In contrast, fiscal equalization in the form of tax base or capacity equalization increases subnational tax rates and thus attenuates competitive forces, which may be efficiency-enhancing when competition effects are strong enough (Köthenbürger 2002; Bucovetsky and Smart 2006; Smart 2007). Municipal fiscal equalization in Germany adheres to the capacity equalization principle, which is also employed in the transfer systems of countries such as Canada and Australia. In such systems, jurisdictions' tax bases are evaluated at a standard tax rate and compared to a benchmark level of spending or revenue to determine the size of the transfer.[1] The transfer to each jurisdiction decreases in its "fiscal capacity."

In this paper, we argue that the so-called "standard tax multipliers" (*fiktive Hebesätze* or *Nivellierungshebesätze*) help to prevent both the race to the bottom and the raiding of the commons. Standard tax multipliers are employed in fiscal equalization schemes to calculate the fiscal capacity from taxes for which subnational governments enjoy tax autonomy. In the case of German municipalities, the business tax is one of the most important components of fiscal capacity. The use of standard tax multipliers has the following effect: If the municipality's actual business tax multiplier is smaller than the standard tax multiplier, the accounted standardized business tax revenue is greater than actual business tax revenue (and vice versa). While the effects of most mechanisms within the equalization system are unknown to the municipalities, the municipalities are well aware of the impact of the standard tax multiplier (i.e., the "overestimation" of tax revenue if the standard tax multiplier exceeds their business tax multiplier). Standard tax multipliers prevent municipalities from neglecting their own tax sources. They provide a signal for an "appropriate" tax rate level, which municipalities are incentivized to follow in order to maximize their revenue. Thus, practitioners at the state level have devised a clever mechanism to circumvent common pitfalls of local tax policy. Consistent with this argument, local business tax rates in Germany hardly appear to have been driven by a race to the bottom. Instead, they exhibited a steady upward trend over the past three decades.[2]

[1] In contrast to most such systems, German municipal fiscal equalization schemes rely on a comparison between "fiscal need" and "fiscal capacity." Moreover, the sum of all equalization transfers is typically fixed by the state level and not endogenous.

[2] Weighted average business tax multipliers in Germany increased from 330 in 1980 and 364 in 1990 to 390 in 2010 (Federal Statistical Office 2014c).

A growing body of empirical literature investigates the incentive effects of equalization systems on tax policy and demonstrates the positive impact of capacity equalization on local tax rates. Egger et al. (2010) exploit a change of the equalization formula in the state of Lower Saxony and show that this reform had a significant impact on municipalities' business tax rates for four consecutive years. Büttner (2006) provides evidence that there is a positive relationship between the marginal contribution rate, defined as the rate at which an increase in the tax base reduces equalization transfers, and local business tax rates in the state of Baden-Württemberg. Smart (2007) investigates the effect of equalization among Canadian provinces, showing that an expansion of transfers leads to higher provincial tax rates.

This paper presents further evidence of the upward pressure that fiscal equalization exerts on local tax rates. We add to the literature by focusing the analysis on standard tax multipliers and using an innovative identification strategy with a new dataset. Standard tax multipliers are an institutional feature of any equalization scheme that relies on so-called "representative tax systems," as well as being present in municipal fiscal equalization in all thirteen German territorial states.[3] The hypothesis of standard tax multipliers as a driver of local tax policy has long been discussed in the applied literature on the evaluation of and reform options for fiscal equalization systems (e.g., Büttner et al. 2008; Parsche and Steinherr 1995; Goerl et al. 2013). Baskaran (2014) even takes this hypothesis as a given in his analysis of local tax mimicking by municipalities in Germany. He views a reform of standard tax multipliers in the state of North Rhine-Westphalia in 2003 as the cause of observable adjustments in actual tax multipliers. This is despite the fact that, to the best of our knowledge, an explicit test of this hypothesis is absent from the academic literature to date. We adapt the theoretical models used in Smart (2007) and Egger et al. (2010) to illustrate the interaction of local taxation and fiscal equalization. This allows us to derive the optimal business tax multiplier as well as the incentive effect of a change in the standard business tax multiplier. Beyond the mechanics exposed in the model, we believe that standard tax multipliers provide an easy-to-read signal to local policymakers. They view standard tax multipliers as a reference for an appropriate and politically feasible tax multiplier. In contrast to changes in eligibility criteria, adjustment levels, or marginal contributions rates, which may also influence local tax multipliers as

[3]Moreover, fiscal equalization between federal states in Germany also employs standard tax rates to standardize property transfer tax revenue since the introduction of state tax rate autonomy for this tax in 2006.

shown in the previous literature, standard tax multipliers have the same magnitude as actual multipliers. As a result, changes in standard tax multipliers are easily translated into perceived necessary adjustments of local multipliers. As stated by Baskaran (2015), hikes in standard tax multipliers also provide a window of opportunity for local officials to raise tax multipliers while deflecting the blame to the state level. Thus, we argue that changes in standard tax multipliers are a more obvious and potentially more powerful trigger of local tax responses than previously analyzed fiscal equalization parameters.

Standard tax multipliers are often equal, or at least related, to the average of actual tax multipliers, creating an endogeneity problem in empirical analysis. A quasi-experiment in North Rhine-Westphalia allows us to solve this problem. Until 1995, North Rhine-Westphalia's equalization scheme featured standard tax multipliers that were differentiated according to municipal population size. In 1993, the state constitutional court ruled that this arbitrary differentiation was not permissible. As a result, North Rhine-Westphalia's state legislature had to adjust its municipal fiscal equalization scheme. The court ruling thus led to exogenous variation in the standard tax multiplier for small municipalities. The strict exogeneity of this reform is in contrast to other reforms where standard tax multipliers are adjusted to better reflect actual average tax multipliers.

Our empirical analysis is based on a balanced panel dataset of annual administrative data for all 396 municipalities of North Rhine-Westphalia. The dataset covers the time period from 1987 to 2002, thereby containing information on the pre-reform, reform and post-reform periods. It draws on a variety of official statistics data sources. The rich and unique dataset includes a number of municipal- and county-level control variables.

Our research design combines a municipal-level fixed effects model with a difference-in-differences approach, where local business tax multipliers are regressed on interaction terms between treatment groups and treatment points. Our identification strategy exploits the exogenous (quasi-experimental) variation of the standard tax multiplier for "small" municipalities induced by the reform of the North Rhine-Westphalian municipal fiscal equalization system in the mid-1990s. We find a positive effect of the standard business tax multiplier on local business tax multipliers, as predicted by theoretical considerations. The findings are robust to a number of alternative specifications.

Section 2.2 clarifies the institutional features of the German business tax and municipal fiscal equalization. Section 2.3 introduces the theoretical model. Section 2.4 explains our empirical approach and data. Section 2.5 presents the results of the empirical analysis. Section 2.6 concludes.

2.2 Institutional background

Germany's federal structure is a key determining factor of the country's fiscal landscape. The federal level, the three city-states and 13 territorial states, and the more than 11,000 municipalities each have differing degrees of tax autonomy over different taxes. For German municipalities, the business tax (*Gewerbesteuer*) and the equalization transfers (*Schlüsselzuweisungen*) provided to them by their federal state are two of the most important income sources.[4] In 2013, municipal net revenue from the business tax and fiscal equalization transfers accounted for 15.8 and 14.3% of aggregate municipal income, respectively (Federal Statistical Office 2014b).

2.2.1 Business taxation

It is a particularity of the German tax system that municipalities enjoy business tax autonomy. Each municipality sets its own local business tax multiplier (*Gewerbesteuerhebesatz*). In contrast, the business tax base and the basic tax rate (*Steuermesszahl*)[5] are defined at the federal level. The resulting tax rate is determined by multiplying the local business tax multiplier with the basic federal tax rate. The business tax is charged on operating profits of corporate and non-corporate firms. In 2013, gross business tax revenue amounted to 43 billion (bn) euros, making it Germany's third most revenue-generating tax (Federal Statistical Office 2014a).

2.2.2 Municipal fiscal equalization

In 2013, municipal fiscal equalization transfers in Germany totaled 29.4 bn euros (Federal Statistical Office 2014b). These transfers serve a double purpose. First, most German municipalities lack sufficient own revenue sources to fund their tasks. The transfers they receive from their respective federal state via its municipal fiscal equalization system thus serve a fundamental financing function. Second, the transfers are designed to reduce differences in municipalities' capacities to provide public goods.

[4]Other relevant sources are the local property tax, the municipal shares of value-added tax (VAT) and income tax, as well as duties and charges.

[5]The basic federal tax rate was set at 5% (with lower rates for operating profits below 48.000 euros) during our sample period. It was reduced to a uniform rate of 3.5% in 2007.

Municipal fiscal equalization systems function similarly in all German states. All of them employ the same basic mechanism of comparing a fictitious measure of "fiscal need" with a standardized measure of "fiscal capacity." Total fiscal equalization transfers $\sum_{i=1}^{I} T_i$ (*Schlüsselmasse*, i.e., the sum of all equalization transfers paid out in one year in the state in question) are predetermined. The fiscal equalization transfer T_i of municipality i equals

$$T_i = \alpha(\beta N_i - C_i) \; \forall \; i \text{ with } \beta N_i > C_i. \tag{2.1}$$

T_i depends on the combined effect of the following factors: Adjustment level α, i.e., the degree to which the difference between fiscal need and fiscal capacity is equalized; fictitious measure of fiscal need, which is calculated by multiplying a fiscal need number N_i by the basic amount β; standardized measure of fiscal capacity C_i.[6]

Municipalities whose fiscal capacity exceeds their fiscal need are called "abundant" and do not benefit from fiscal equalization transfers. The basic amount is determined via an iterative process and equals[7]

$$\beta = \frac{\sum_{i=1}^{I} T_i + \alpha \sum_{i=1}^{I} C_i}{\alpha \sum_{i=1}^{I} N_i} \; \forall \; i \text{ with } \beta N_i > C_i. \tag{2.2}$$

While the derivation of the fictitious measure of fiscal need is negligible with respect to the focus of this paper, the derivation of the standardized measure of fiscal capacity is not. Fiscal capacity is the sum of standardized business and property tax revenue and the (unstandardized) municipal share of VAT and income tax revenue. To assure local tax multiplier autonomy, municipal fiscal equalization systems employ so-called standard tax multipliers to evaluate tax revenue from taxes for which the municipalities set tax multipliers (business and property tax). Standard tax multipliers are set by the respective federal states. Standardized business tax revenue R_i^{std} equals

$$R_i^{std} = s \times \frac{R_i}{m_i} \tag{2.3}$$

[6]In addition to such "common" fiscal equalization transfers, some states employ special transfers to municipalities suffering from a very low standardized tax revenue to ensure that they achieve a pre-defined level of fiscal resources. However, this is not the case in North Rhine-Westphalia.

[7]Due to the endogeneity of the basic amount, the comparative statics of municipal fiscal equalization are not straightforward and unknown to municipalities.

with R_i :=business tax revenue, m_i :=business tax multiplier and s :=standard tax multiplier.[8]

If the actual business tax multiplier is smaller than the standard tax multiplier, the accounted standardized tax revenue is greater than the actual business tax revenue (and vice versa). While the effects of most mechanisms within the equalization system are unknown to the municipalities, they are well aware of the impact of the standard tax multiplier (i.e., the "overestimation" of tax revenue if the standard tax multiplier exceeds their business tax multiplier).

2.3 A simple theoretical model

To understand the incentive effect of standard tax multipliers, we develop a simple theoretical model of local taxation and fiscal equalization with two revenue-maximizing local jurisdictions. It is a version of the models employed by Egger et al. (2010) and Smart (2007), which we extend to include the standard tax multiplier as well as the basic amount. It allows us to derive the optimal business tax multiplier and the incentive effect of a change in the standard business tax multiplier. Suppose there are two municipalities i and j whose sole income sources are business taxation and fiscal equalization transfers. The business tax base B_i of municipality i depends not only on its own business tax rate m_i, but also on the one of municipality j, m_j:

$$B_i = B_i^0 + \gamma m_j - \delta m_i \tag{2.4}$$

where $B_i^0 \geq 0$ and $\delta > \gamma \geq 0$. Tax revenue R_i thus becomes

$$R_i = m_i(B_i^0 + \gamma m_j - \delta m_i). \tag{2.5}$$

Fiscal capacity C_i is

$$C_i = \frac{sR_i}{m_i} = s(B_i^0 + \gamma m_j - \delta m_i) \tag{2.6}$$

where s again denotes the standard tax multiplier.

[8]Standardized property tax revenue is determined equivalently.

Assuming that both municipalities are non-abundant, the respective fiscal equalization transfers T_i are derived by inserting Equation (2.2)[9] into Equation (2.1):

$$T_i = \alpha \left[\frac{\sum T_{i,j} + \alpha s \left(B_i^0 + \gamma m_j - \delta m_i + B_j^0 + \gamma m_i - \delta m_j \right)}{\alpha \left(N_i + N_j \right)} N_i - s \left(B_i^0 + \gamma m_j - \delta m_i \right) \right] \tag{2.7}$$

As an auxiliary assumption, suppose that both municipalities seek to maximize their revenue from taxes and transfers:

$$\max_{m_i} R_i + T_i \tag{2.8}$$

The reduced-form equation for the optimal tax rate of municipality i then becomes:

$$m_i* = \frac{1}{4\delta^2 - \gamma^2} \left[2\delta B_i^0 + \gamma B_j^0 + \alpha s \left\{ \gamma\delta + 2\delta^2 + \frac{1}{N_i + N_j} \left(\gamma N_j(\gamma - \delta) + 2\delta N_i(\gamma - \delta) \right) \right\} \right] \tag{2.9}$$

This leads to the following first derivative with respect to the standard tax multiplier s:

$$\frac{\partial m_i^*}{\partial s} = \frac{1}{4\delta^2 - \gamma^2} \left[3\delta\gamma N_i + N_j(2\delta^2 + \gamma^2) \right] > 0 \tag{2.10}$$

Proposition: *An increase in the standard tax multiplier increases the optimal tax multiplier chosen by the municipalities.*

Given this relationship, the use of standard tax multipliers prevents municipalities from neglecting their own revenue sources and provides a clever way to circumvent the common pool problem. Because of standard tax multipliers, fiscal equalization acts as a tax on tax multiplier reductions. Whenever a municipality lowers its tax multiplier in order to increase its tax base, its fiscal capacity rises. The higher the standard tax multiplier, the greater are the increase in fiscal capacity and the corresponding reduction in equalization transfers. What is more, many municipalities consider the standard tax

[9] The first-round basic amount becomes:

$$\beta_1 = \frac{\sum_{i=1}^{I} T_i + \alpha s(B_i^0 + \gamma m_j - \delta m_i + B_j^0 + \gamma m_i - \delta m_j)}{\alpha(N_i + N_j)}.$$

multiplier as a signal for their own tax policy. In contrast to changes in the adjustment level α, which also induce tax multiplier reactions, changes in s are easily translated into appropriate adjustments of the local tax multiplier, as both have the same magnitude. Therefore, a race to the bottom in local business tax rates does not occur when standard tax multipliers are used in equalization.

2.4 Empirical approach

In this section we first provide background information on the quasi-experiment exploited in the empirical analysis, before we present our data sources and outline our empirical model. Last, we discuss our identification strategy.

2.4.1 Quasi-experiment

We exploit a quasi-experiment in the state of North Rhine-Westphalia for an empirical test of our proposition. North Rhine-Westphalia offers a promising case to study given that it is the most populous German state with over 17 million inhabitants. Moreover, it stands out as a state where municipalities' business tax multipliers are high relative to those found elsewhere in Germany. The same applies to its standard tax multipliers.

Like those in the other 12 territorial states, the 396 North Rhine-Westphalian municipalities receive state transfers through a municipal fiscal equalization system. Each year, several billion euros (8 bn in 2014) are paid out as equalization transfers. North Rhine-Westphalia currently sets a single standard tax multiplier with respect to the business tax. Until 1995, the equalization scheme featured standard tax multipliers that were differentiated according to population size. The fiscal capacity of municipalities with up to 150,000 inhabitants ("small" municipalities) was calculated using a standard tax multiplier of 350. The fiscal capacity of municipalities whose population size exceeded this threshold ("big" municipalities) was evaluated with a standard tax multiplier of 380. In 1993, the state constitutional court ruled that this arbitrary differentiation was not permissible (VerfGH 9/92, 22/92).[10] As a result, North Rhine-Westphalia's state legislature was required to adjust its municipal fiscal equalization scheme. Standard tax multipliers for municipalities with less than 150,000 inhabitants were increased in three equal steps between 1996 and

[10]The differentiation was found to be arbitrary as long as the legislator had not established why it was warranted for objective reasons.

1998 to reach the larger cities' multiplier. This 30-points change amounted to an increase of 8.5% in the standardized tax multiplier. The court ruling thus led to sizable exogenous variation in the standard tax multiplier for small municipalities. To the best of our knowledge, this quasi-experiment has not been used in the literature to date.

2.4.2 Data sources

Our empirical analysis is based on a balanced panel dataset of annual administrative data for all 396 municipalities of North Rhine-Westphalia. The dataset covers the time period from 1987 to 2002, thereby containing information on the pre-reform, reform and post-reform periods. It draws on a variety of official statistics data sources, namely North Rhine-Westphalia's statistical office (*IT.NRW*), the Regional Database Germany (*Regionaldatenbank Deutschland*) and the Federal Employment Agency (*Bundesagentur für Arbeit*). The rich and unique dataset includes municipal business tax multipliers, inhabitants, income tax and VAT shares, employees at place of employment, gross domestic product (GDP) (at county level), disposable income of private households (at county level), municipal debt, tax bases and revenues from property and business taxes, commuters and municipal surface area. There are 375 "small" and 21 "big" municipalities up until 1999. From 2000 onwards, one additional city has more than 150,000 inhabitants.

Table 2.1: Summary statistics, 1987-2002

Variable	Mean	Std. Dev.	Min.	Max.	N
Business tax multiplier	373.284	35.652	250	490	6336
Income tax share	0.286	0.05	0.17	0.484	4356
GDP	20.732	4.013	13.066	62.922	3960
Inc. of priv. households	16.645	1.642	13.136	21.456	3168
Employees	0.259	0.093	0.048	0.625	3960
Surface area	0.429	0.345	0.028	2.36	4356

Notes: Business tax multiplier (in %), surface area (in hectare (ha) p.c.), income tax share (in 1,000 euro p.c.), employees (p.c.) (municipal level) and income of private households (in 1,000 euro p.c.), GDP (in 1,000 euro p.c.) (county level); number of observations: 396 municipalities per year. Own calculations based on data from IT.NRW, Regional Database Germany and the Federal Employment Agency.

Table 2.1 provides summary statistics for the most important variables, which are reported in per capita (p.c.) terms with the exception of business tax multipliers. Between

1987 and 2002, business tax multipliers in North Rhine-Westphalia varied between 250 and 490, with an unweighted average of 373.28. Table 2.1 also illustrates some data availability issues. None of the tabulated control variables are available for all years. Municipal income tax shares, GDP and surface area have only been reported since 1992.[11] There are no data on the disposable income of private households before 1995 or on the number of employees before 1993. More detailed summary statistics are provided in Tables 2.6, 2.7 and 2.8 in the appendix to this chapter.

Figure 2.1 depicts the difference between average business tax multipliers of "big" and "small" municipalities between 1992 and 2002.[12] The three dashed vertical lines mark the three reform years where standard business tax multipliers for small municipalities were raised. As shown, the average business tax multiplier of big municipalities was more than 70 percentage points higher than that of small municipalities at the outset. During the three reform years, the difference in averages dropped sharply, to a level of 60 percentage points and below.

[11] GDP is also missing in 1993.

[12] In 2003, the standard tax multiplier was increased to 403 for all North Rhine-Westphalian communities.

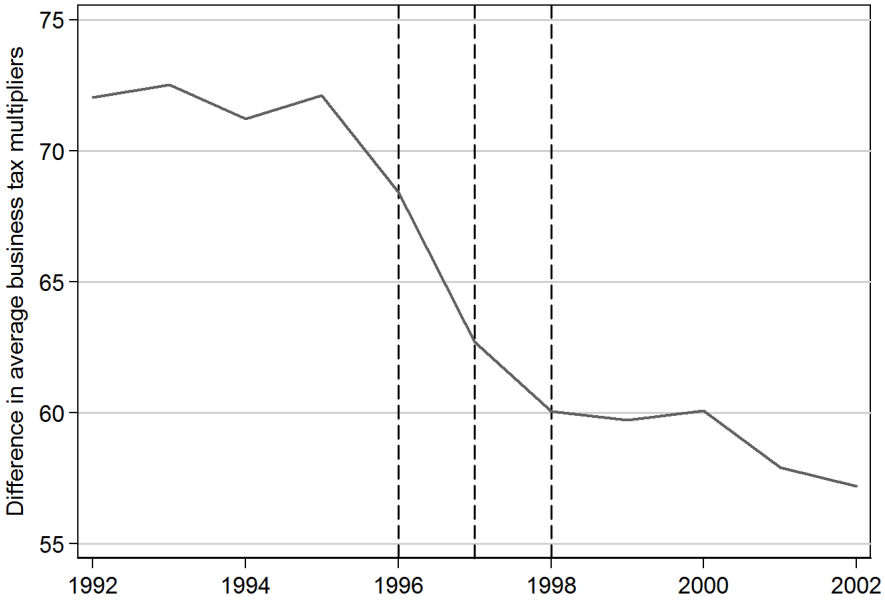

Figure 2.1: Difference in average business tax multipliers between "big" and "small" municipalities, 1992-2002

Source: Own calculations based on data from IT.NRW.

2.4.3 Empirical model

Our research design combines a municipal-level fixed effects model with a difference-in-differences approach. The dependent variable is the business tax multiplier $m_{i,t}$ of municipality i in year t. Our independent variables of interest are the interaction terms $TG_i \times TP_t$, $t = 1996, ..., 1998$ between treatment groups ($TG_i = 1$ if population $\leq 150,000$ and 0 otherwise)[13] and treatment points ($TP_{1996} = 1$ if $t = 1996$, $TP_{1997} = 1$ if $t = 1997$, $TP_{1998} = 1$ if $t = 1998$ and 0 otherwise).

We include two types of control variables to adjust for observable time-variant differences between municipalities: $\mathbf{X_{i,t}}$ and $\mathbf{Z_{c,t}}$ represent column vectors of municipal-level variables (debt p.c., share of income tax etc.) and county-level variables (GDP p.c. etc.), respectively. Furthermore, we control for municipal and year fixed effects (λ_i, Φ_t). The municipal fixed effects account for unobserved but time-invariant omitted municipal-level factors that may influence business tax multipliers. By adding year fixed effects

[13]Population size in 1995 determines assignment to treatment groups for the one municipality that grows beyond 150,000 inhabitants in 2000.

to the regression equation we are able to control for common shocks affecting tax rates across all municipalities in a given year. We use the following regression model with $t = 1995, ..., 1998$:

$$m_{i,t} = \alpha TG_i + \delta_{1996} TG_i \times TP_{1996} + \delta_{1997} TG_i \times TP_{1997} + \delta_{1998} TG_i \times TP_{1998} + \beta \mathbf{X_{i,t}} + \theta \mathbf{Z_{c,t}} + \lambda_i + \Phi_t + \varepsilon_{i,t} \tag{2.11}$$

where the error term $\varepsilon_{i,t}$ is clustered on the county level.

Our coefficients of interest δ_{1996}, δ_{1997} and δ_{1998} measure how the business tax multiplier differential between "small" municipalities (treatment group) and "big" municipalities (control group) changed ceteris paribus (c.p.) between the reference year 1995 and 1996, 1997 and 1998, respectively.

2.4.4 Discussion of identification

Our identification strategy exploits the exogenous (quasi-experimental) variation of the standard tax multiplier for "small" municipalities induced by the reform of the North Rhine-Westphalian municipal fiscal equalization system in the mid-1990s. In contrast to later changes to standard business tax multipliers, this reform was prompted by a court ruling and is therefore truly exogenous. The chosen identification strategy thus circumvents typical endogeneity concerns.[14] The validity of identification hinges on the assumption of a common trend between treatment and control groups.[15] We assume that business tax multipliers would have evolved in parallel in the absence of treatment (conditional on other included independent variables). Without treatment, δ_{1996}, δ_{1997} and δ_{1998} would have to be zero.

Differences in administrative status between the treatment and the control groups might pose a potential concern regarding this identifying assumption. All 21 cities in the control groups are cities with county status. Of the 375 municipalities in the treatment group, only two have county status, while the remaining 373 belong to a county. If there had been systematic differences in or changes to the financing structure or spending re-

[14] Standard tax multipliers were not set exogenously in later reforms (2003, 2011).

[15] Although we distinguish "treated" and "untreated" municipalities, it is important to note that transfer payments to all municipalities were affected by the reform: The sum of all transfers is fixed and the change in the standard tax multiplier affects how this sum is distributed among all municipalities.

sponsibilities of municipalities with as opposed to without county status during our sample period, this might constitute a violation of the common trend assumption. We know of no such major shifts during the period of interest. Moreover, the revenue sources of cities with county status are equivalent to those of municipalities belonging to a county: Both rely on the same types of taxes, fees and charges, transfers, etc. In contrast, counties are financed solely through state transfers and the *Kreisumlage*, a financial contribution levied from municipalities within the county. Through this levy, municipalities belonging to a county share the responsibility for financing county-level spending. Given this administrative and fiscal setup, we believe that our treatment and control groups are sufficiently comparable.

Systematic differences in the degree to which both groups suffer from fiscal distress and find themselves under the supervision of regulatory authorities might also bias our estimation results. In recent years, regulatory authorities have been bound by official decrees to ensure that local tax multipliers of municipalities operating under budget consolidation plans are higher or at least equal to average state-wide tax multipliers of municipalities in their population size range. This might induce upward movements in tax multipliers which are unrelated to standard tax multipliers. There are unfortunately no official records on municipalities with budget consolidation plans in the mid-1990s. However, according to the Ministry of the Interior, the practice of actively influencing tax multipliers is a relatively new phenomenon. To the best of their knowledge, no official decrees existed during our sample period that would have mandated regulatory authorities to make higher tax rates a precondition for the approval of budget consolidation plans. What is more, budget consolidation plans were much less widespread during our sample period than they are today. Thus, we are confident in the validity of the common trend assumption.

We investigate the common trend by plotting the development of the average business tax multipliers of "small" municipalities (treatment group) and "big" municipalities (control group) between 1987 and 2010 (Figure 2.2). The former is represented by the gray dashed and the latter by the black dotted line. The corresponding standard tax multipliers are shown in gray ("small" municipalities) and black ("big" municipalities/ all municipalities). Figure 2.2 supports the common trend assumption. Both groups have seen a gradual upward trend since 1987. The development of their business tax multipliers

has been similar for most of the time period. Visible exceptions with some convergence of averages occurred during the reform years 1996-1998 and 2003 (see also Figure 2.1).[16]

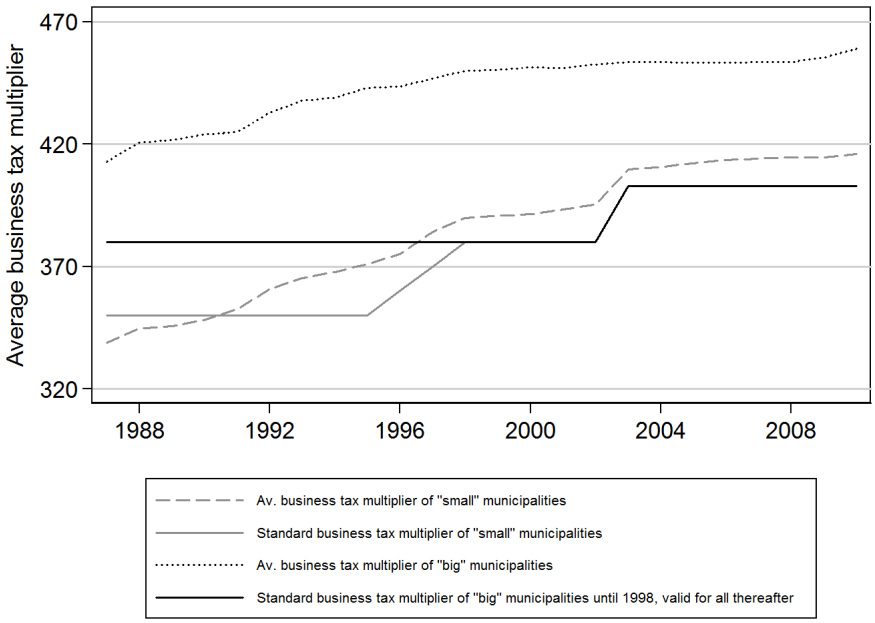

Figure 2.2: Development of average business tax multipliers and standard business tax multipliers, 1987-2010

Source: Own calculations based on data from IT.NRW.

2.5 Results

In this section we first present our main results. Next, we perform a number of robustness checks to validate our results. Last, we provide an extension to test if "small" municipalities' reactions to the reform differed systematically depending on their pre-reform business tax multipliers.

2.5.1 Main results

Table 2.2 shows results for two regressions where $t = 1995, ..., 1998$. We restrict our main analysis to the reform period as we expect municipalities to react instantaneously to

[16] As mentioned above, there was another reform in 2003. The incentive effect was stronger for the group of "small" municipalities due to their lower business tax multipliers.

changes in applicable standard tax multipliers. Specification *I* contains baseline results for a regression without any control variables apart from the usual municipal and year fixed effects. The regression displayed in Specification *II* includes income tax shares, GDP and disposable income of private households, surface area and the number of employees at place of work (each per capita) as additional controls.

Table 2.2: Regression results

	I Baseline	II With controls
Treatment group × 1996	3.694***	3.527***
	(0.755)	(1.077)
Treatment group × 1997	9.406***	6.772***
	(1.974)	(2.296)
Treatment group × 1998	12.047***	8.471***
	(2.321)	(2.883)
Income tax share		92.080**
		(41.175)
GDP		-1.479*
		(0.765)
Inc. of priv. households		4.056
		(3.661)
Surface area		-54.038
		(44.459)
Employees		48.119
		(33.958)
N	1584	1584
R^2	0.498	0.512

Notes: Fixed effects estimates based on Equation 2.11. Balanced panel of all 396 municipalities for the period 1995 to 1998. Dependent variable: business tax multiplier (in %) (municipal level). Independent variables of interest: interaction terms between treatment group and treatment points. Treatment group: "small" municipalities, whose standard tax multiplier was increased in three equal steps between 1996 and 1998. Control group: "big" municipalities, whose standard tax multiplier was not affected by the reform. Treatment points: 1996, 1997 and 1998. Base year: 1995. Base group: control group. Both specifications control for municipal and year fixed effects. Specification *II* additionally controls for income of private households (in 1,000 euro p.c.), GDP (in 1,000 euro p.c.) (county level) and surface area (in ha p.c.), income tax share (in 1,000 euro p.c.) and employees (p.c.) (municipal level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

In line with our expectations, the interaction terms $TG_i \times TP_t$, $t = 1996, ..., 1998$, between treatment group and treatment point dummies are highly significant with positive estimated coefficients in both regression specifications. According to the baseline specification, business tax multipliers of small municipalities were about 3.7 percentage points higher in 1996 than in 1995 ($\delta_{1996} = 3.694$), c.p. They rose by another 5.7 percentage points in the following year ($\delta_{1997} - \delta_{1996} = 5.712$). A smaller adjustment of about 2.6 percentage points took place in 1998, the final year of the reform ($\delta_{1998} - \delta_{1997} = 2.641$). Given the annual increase of the standard tax multiplier of 10 percentage points, the degree of adjustment of small municipalities' tax multipliers is remarkable.

Adding time-variant controls slightly affects the coefficients of interest (Specification *II*). Per capita income tax shares and GDP each turn out to be individually significant covariates. Per capita disposable income of private households, surface area and employees at place of employment are jointly significant with the remaining controls and further improve the goodness of fit as measured by the R^2. The results of Specification *II* support the general magnitude and the direction of the reform effect. However, they also suggest that the development of business tax multipliers is affected by time-variant factors aside from the reform. We expect the common trend between treatment and control groups to hold conditional on these time-varying factors. Our results are stable across all tested model specifications.[17]

2.5.2 Robustness checks

To validate our results, we perform equivalent regressions using the full dataset where t runs from 1987 to 2002 and corresponding interactions terms $TG_i \times TP_t$, $t = 1987, ..., 1994, 1996, ..., 2002$ and year fixed effects are added. Specification *III* of Table 2.3 shows the results of such a regression without any further control variables.

[17]Further potential controls were tested (e.g., debt p.c. and commuters p.c.), but were not significant and did not improve goodness of fit.

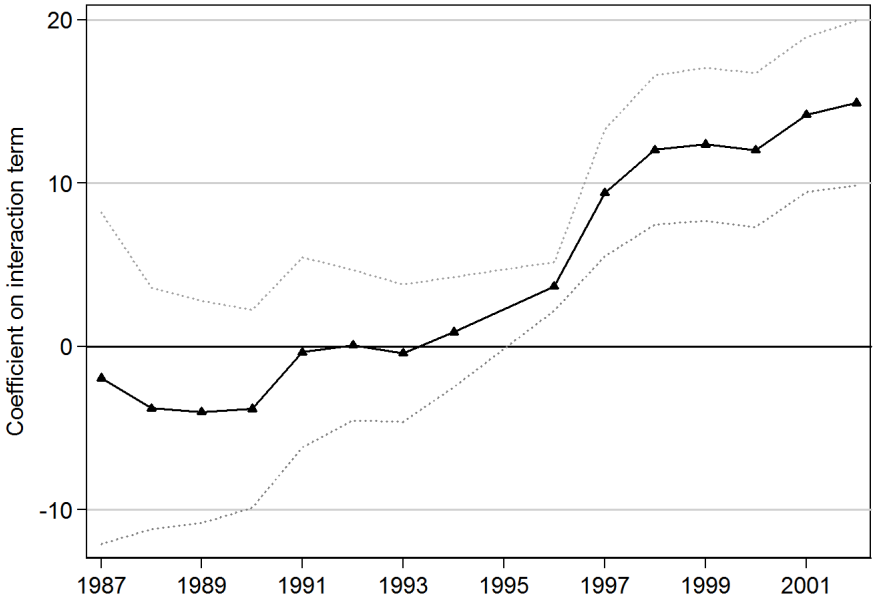

Figure 2.3: Coefficients on interaction terms

Notes: Dotted lines mark 95% confidence intervals around point estimates.
Source: Own calculations based on data from IT.NRW.

The coefficients of interest, δ_t, belonging to this regression are also illustrated in Figure 2.3. Importantly, the interaction terms $TG_i \times TP_t$, $t = 1987, ..., 1994$ belonging to the pre-reform period are all individually and jointly statistically insignificant. In contrast, the interaction terms $TG_i \times TP_t$, $t = 1996, ..., 2002$ of the reform and post-reform period are all highly significant with positive coefficients, indicating an upward shift of business tax multipliers triggered by the reform. The estimated adjustment during the reform years 1996 to 1998 is exactly the same as in Specification I of Table 2.2. In the years following the reform, estimated coefficients δ_{1999} to δ_{2002} remain fairly stable. This lends support to the notion of an immediate response to each annual change of the standard tax multiplier.[18] Due to limitations in data availability (see Section 2.4.2), a regression using pre-reform data and a set of control variables is not possible. However, the analysis can be extended to post-reform years. This is done in Specification IV of Table 2.3 where t runs from 1995 to 2002 and per capita income tax shares, GDP, disposable income, surface area

[18]The slightly higher coefficients in 2001 and in 2002 might be due to anticipating reactions to the 2003 reform.

and employees again have been included as control variables. Again, the reform effects are significant and their magnitude and direction are in line with our expectations.

Table 2.3: Regression results (extended time period)

	III	IV
	Pre- and post-reform	Post-reform
Treatment group × 1987	-1.927	
	(5.167)	
Treatment group × 1988	-3.782	
	(3.762)	
Treatment group × 1989	-4.001	
	(3.457)	
Treatment group × 1990	-3.808	
	(3.081)	
Treatment group × 1991	-0.347	
	(2.955)	
Treatment group × 1992	0.089	
	(2.343)	
Treatment group × 1993	-0.402	
	(2.138)	
Treatment group × 1994	0.888	
	(1.715)	
Treatment group × 1996	3.694***	3.533***
	(0.755)	(0.879)
Treatment group × 1997	9.406***	7.578***
	(1.975)	(1.940)
Treatment group × 1998	12.047***	10.291***
	(2.323)	(2.298)
Treatment group × 1999	12.387***	11.092***
	(2.383)	(2.457)
Treatment group × 2000	12.035***	9.824***
	(2.398)	(2.611)
Treatment group × 2001	14.203***	11.754***
	(2.416)	(2.777)
Treatment group × 2002	14.916***	12.554***
	(2.562)	(2.927)

	III Pre- and post-reform	IV Post-reform
Income tax share		100.505***
		(31.279)
GDP		-0.418
		(0.409)
Inc. of priv. households		1.269
		(1.755)
Surface area		-15.049
		(24.808)
Employees		25.773*
		(15.359)
N	6336	3168
R^2	0.760	0.551

Notes: Specifications *III* and *IV* are based on a balanced panel of all 396 municipalities for the period 1987 to 2002 and 1995 to 2002, respectively. Dependent variable: business tax multiplier (in %) (municipal level). Independent variables of interest: interaction terms between treatment group and treatment points. Treatment group: "small" municipalities, whose standard tax multiplier was increased in three equal steps between 1996 and 1998. Control group: "big" municipalities, whose standard tax multiplier was not affected by the reform. Treatment points: 1987 to 1994 (only Specification *III*), 1996 to 2002. Base year: 1995. Base group: control group. Both specifications control for municipal and year fixed effects. Specification *IV* additionally controls for income of private households (in 1,000 euro p.c.), GDP (in 1,000 euro p.c.) (county level) and surface area (in ha p.c.), income tax share (in 1,000 euro p.c.) and employees (p.c.) (municipal level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

As an additional robustness check, we rerun Specifications *I* and *II* of Table 2.2, this time excluding municipalities that were abundant, i.e., did not receive any equalization transfers, at any point between 1995 and 1998. This reduces the number of municipalities in the treatment group to 316. There are 19 municipalities left in the control group. Municipalities that did not benefit from equalization transfers presumably faced weaker incentives to raise their tax multipliers following the increase in their standard tax multiplier. Some incentive effect remains as it is very hard, if not impossible, for most municipalities to predict whether their fiscal capacity might exceed their fiscal need in a

given year. Nonetheless, we expect the estimated treatment effect to be stronger than in our baseline specification.

Table 2.4 shows the corresponding regression results. The estimated treatment effect is very similar and slightly more pronounced than in our baseline specifications, confirming our expectations.

Table 2.4: Regression results (excluding abundant municipalities)

	V Baseline	VI With controls
Treatment group × 1996	3.695***	3.386***
	(0.847)	(1.179)
Treatment group × 1997	10.227***	7.325***
	(2.151)	(2.361)
Treatment group × 1998	12.921***	9.024***
	(2.526)	(2.872)
Income tax share		85.131*
		(49.956)
GDP		-1.337
		(0.824)
Inc. of priv. households		6.250*
		(3.517)
Surface area		-36.957
		(39.868)
Employees		47.738
		(33.627)
N	1340	1340
R^2	0.535	0.553

Notes: Fixed effects estimates based on Equation 2.11. Balanced panel of 335 municipalities, which received transfers in all years from 1995 to 1998, for the period 1995 to 1998. Dependent variable: business tax multiplier (in %) (municipal level). Independent variables of interest: interaction terms between treatment group and treatment points. Treatment group: "small" municipalities, whose standard tax multiplier was increased in three equal steps between 1996 and 1998. Control group: "big" municipalities, whose standard tax multiplier was not affected by the reform. Treatment points: 1996, 1997 and 1998. Base year: 1995. Base group: control group. Both specifications control for municipal and year fixed effects. Specification *VI* additionally controls for income of private households (in 1,000 euro p.c.), GDP (in 1,000 euro p.c.) (county level) and surface area (in ha p.c.), income tax share (in 1,000 euro p.c.) and employees (p.c.) (municipal level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

2.5.3 Extension

Lastly, we adapt our model to test if "small" municipalities' reactions to the reform differed systematically depending on their pre-reform business tax multipliers. We expect to find a more pronounced effect for "small" municipalities with a "low" pre-reform business tax multiplier. We operationalize these considerations by distinguishing two groups within our original treatment group: Treatment group 1 consists of the 217 "small" municipalities whose business tax multiplier was smaller than 380 in 1995 ($TG1_i = 1$ if population $\leq 150,000$ and $m_{i,1995} < 380$ and 0 otherwise). Treatment group 2 refers to the 158 "small" municipalities with business tax multipliers greater than or equal to 380 in 1995 ($TG2_i = 1$ if population $\leq 150,000$ and $m_{1995} \geq 380$ and 0 otherwise). The corresponding interaction terms are defined as $TG1_i \times TP_t$ and $TG2_i \times TP_t$, $t = 1996, ..., 1998$. We estimate the following regression equation with $t = 1995, ..., 1998$:

$$m_{i,t} = \alpha_1 TG1_i + \alpha_2 TG2_i + \sum_{t=1996}^{1998} \delta_{1,t}\, TG1_i \times TP_t + \sum_{t=1996}^{1998} \delta_{2,t}\, TG2_i \times TP_t + \beta \mathbf{X_{i,t}} + \theta \mathbf{Z_{c,t}} + \lambda_i + \Phi_t + \varepsilon_{i,t} \quad (2.12)$$

Table 2.5 shows the results for differentiated treatment groups, with Specification *V* displaying the regression without controls (except for the usual municipal and year fixed effects) and Specification *VI* including the same time-variant controls as Specifications *II* and *IV*.

In line with our expectations, we find a much stronger reform effect on the business tax multipliers of treatment group 1 than on those of treatment group 2. All interaction terms between treatment group 1 and treatment point dummies are highly statistically significant with positive estimated coefficients $\delta_{1,t}$. The size of the estimated coefficient on the interaction term between treatment group 1 and treatment point 1996 is rather low and close to the one of treatment group 2 (Specification *V*: $\delta_{1,1996} - \delta_{2,1996} = 0.951$). This is not the case in 1997 and 1998: According to Specification *V*, the business tax multipliers of treatment group 1 were about 13.4 percentage points higher in 1997 than in 1995 ($\delta_{1,1997} = 13.375$) and continued rising in 1998 ($\delta_{1,1998} = 17.284$).

In contrast, the estimated effects of the interaction terms between treatment group 2 and the treatment point dummies are rather stable ($\delta_{2,1996} = 3.144, \delta_{2,1997} = 3.956$ and $\delta_{2,1998} = 4.855$). Moreover, statistical significance of treatment group 2's interaction terms

is low compared with those of treatment group 1 and in case of $\delta_{2,1998}$ depends on the specification used.

Table 2.5: Regression results (two treatment groups)

	V Two treatment groups	VI With controls
Treatment group (1) × 1996	4.095***	4.782***
	(1.046)	(1.339)
Treatment group (2) × 1996	3.144***	3.360***
	(0.897)	(0.961)
Treatment group (1) × 1997	13.375***	14.279***
	(2.113)	(2.588)
Treatment group (2) × 1997	3.956*	3.945*
	(2.080)	(2.282)
Treatment group (1) × 1998	17.284***	16.836***
	(2.209)	(2.815)
Treatment group (2) × 1998	4.855*	3.811
	(2.525)	(2.844)
Employees		43.035
		(28.682)
Income tax share		-56.122
		(42.267)
GDP		-1.436**
		(0.606)
Inc. of priv. households		2.603
		(2.663)
Surface area		20.049
		(42.173)
N	1584	1584
R^2	0.560	0.565

Notes: Fixed effects estimates based on Equation 2.12. Balanced panel of all 396 municipalities for the period 1995 to 1998. Dependent variable: business tax multiplier (in %) (municipal level). Independent variables of interest: interaction terms between treatment groups and treatment points. Treatment group 1: "small" municipalities whose business tax multiplier was smaller than 380 in 1995, and whose standard tax multiplier was increased in three equal steps between 1996 and 1998. Treatment group 2: "small" municipalities whose business tax multiplier was greater than or equal to 380 in 1995, and whose standard tax multiplier was increased in three equal steps between 1996 and 1998. Control group: "big" municipalities, whose standard tax multiplier was not affected by the reform. Treatment points: 1996, 1997 and 1998. Base year: 1995. Base group: control group. Both specifications control for municipal and year fixed effects. Specification *VI* additionally controls for income of private households (in 1,000 euro p.c.), GDP (in 1,000 euro p.c.) (county level) and surface area (in ha p.c.), income tax share (in 1,000 euro p.c.) and employees (p.c.) (municipal level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

In summary, we find that the rise of the standard business tax multiplier had an effect on the business tax multipliers of all "small" municipalities, but this effect was particularly strong for municipalities with a "low" pre-reform business tax multiplier (i.e, pre-reform business tax multiplier below post-reform standard tax multiplier).

2.6 Conclusion

Conventional economic wisdom suggests that decentralized business taxation and a common pool of equalization transfers among local jurisdictions should lead to a race to the bottom in local business tax rates. In practice, however, a simple institutional device, standard tax multipliers, is used to counteract downward pressure on municipal tax rates and tax effort. Standard tax multipliers are employed in fiscal equalization schemes in all German territorial states to assess a municipality's fiscal capacity independently of its actual tax multiplier.

Using the case of North Rhine-Westphalia in the mid-1990s, this paper empirically analyzes the impact of standard business tax multipliers on municipal business tax policy. The results show that upward shifts in standard business tax multipliers lead to immediate upward adjustments in actual business tax multipliers. This is true for all affected municipalities. The reaction is more pronounced for municipalities whose business tax multipliers are below post-reform standard tax multipliers. The findings are robust to a number of alternative specifications. They also reflect the positive incentive effect derived from theoretical considerations.

Our results have important implications for the practical design of fiscal equalization schemes. They highlight the importance of the parameters of equalization systems for shaping local tax policy. Through its choice of the standard tax multiplier, a state can influence the level of municipal tax rates and the weight of competitive downward forces. Some states choose to set standard tax multipliers that are so low that they have virtually no signaling effect while others induce a race to the top in local taxation through regular adjustments of standard multipliers. This partially explains why there is far greater heterogeneity in business tax multipliers across federal states than within states in Germany.

By consequence, standard tax multipliers should be regarded as a tool for governments to shape lower-level tax policy, with important consequences for their own competitiveness.

2.7 Appendix

Table 2.6: Summary statistics (means) by year, 1987-2002

Year	BT multiplier	Inc. tax share	GDP	Inc. of priv. households	Employees	Surface area
1987	342.737	.	.	.	.	.
1988	348.838	.	.	.	.	.
1989	349.583	.	.	.	.	.
1990	352.146	.	.	.	.	.
1991	356.376	.	.	.	.	.
1992	364.646	0.294	18.849	.	.	0.450
1993	369.182	0.294	.	.	0.266	0.445
1994	371.593	0.296	19.471	.	0.261	0.440
1995	374.801	0.294	20.066	15.480	0.261	0.434
1996	378.775	0.268	20.288	15.686	0.257	0.430
1997	387.518	0.270	20.603	16.018	0.253	0.426
1998	393.114	0.282	20.992	16.339	0.254	0.423
1999	393.912	0.294	21.287	16.647	0.257	0.420
2000	394.530	0.296	21.699	17.204	0.260	0.418
2001	396.346	0.281	21.884	17.923	0.261	0.416
2002	398.449	0.278	22.181	17.866	0.259	0.414
Total	373.284	0.286	20.732	16.645	0.259	0.429

Notes: Business tax (BT) multiplier (in %), surface area (in ha p.c.), income tax share (in 1,000 euro p.c.), employees (p.c.) (municipal level) and income of private households (in 1,000 euro p.c.), GDP (in 1,000 euro p.c.); number of observations: 396 municipalities p.a. Own calculations based on data from IT.NRW, Regional Database Germany and the Federal Employment Agency.

Table 2.7: Summary statistics (means) for treatment group by year, 1987-2002

Year	BT multiplier	Inc. tax share	GDP	Inc. of priv. households	Employees	Surface area
1987	338.811	.	.	.	.	.
1988	344.813	.	.	.	.	.
1989	345.547	.	.	.	.	.
1990	348.120	.	.	.	.	.
1991	352.533	.	.	.	.	.
1992	360.827	0.291	18.505	.	.	0.472
1993	365.336	0.291	.	.	0.259	0.466
1994	367.816	0.294	19.124	.	0.255	0.461
1995	370.976	0.292	19.690	15.482	0.255	0.455
1996	375.147	0.266	19.935	15.693	0.251	0.451
1997	384.192	0.269	20.239	16.036	0.247	0.447
1998	389.928	0.281	20.604	16.363	0.248	0.444
1999	390.744	0.292	20.899	16.673	0.250	0.440
2000	391.344	0.294	21.289	17.233	0.254	0.438
2001	393.275	0.279	21.471	17.960	0.254	0.436
2002	395.416	0.276	21.755	17.895	0.253	0.435
Total	369.676	0.284	20.351	16.667	0.253	0.450

Notes: Business tax (BT) multiplier (in %), surface area (in ha p.c.), income tax share (in 1,000 euro p.c.), employees (p.c.) (municipal level) and income of private households (in 1,000 euro p.c.), GDP (in 1,000 euro p.c.); number of observations: 375 "small" municipalities p.a. Own calculations based on data from IT.NRW, Regional Database Germany and the Federal Employment Agency.

Table 2.8: Summary statistics (means) for control group by year, 1987-2002

Year	BT multiplier	Inc. tax share	GDP	Inc. of priv. households	Employees	Surface area
1987	412.857	.	.	.	.	.
1988	420.714	.	.	.	.	.
1989	421.667	.	.	.	.	.
1990	424.048	.	.	.	.	.
1991	425.000	.	.	.	.	.
1992	432.857	0.338	24.986	.	.	0.055
1993	437.857	0.342	.	.	0.382	0.055
1994	439.048	0.334	25.658	.	0.373	0.055
1995	443.095	0.335	26.778	15.444	0.368	0.055
1996	443.571	0.308	26.597	15.554	0.363	0.055
1997	446.905	0.298	27.105	15.704	0.360	0.056
1998	450.000	0.315	27.930	15.915	0.360	0.056
1999	450.476	0.331	28.205	16.189	0.366	0.056
2000	451.429	0.326	29.037	16.692	0.372	0.056
2001	451.190	0.311	29.245	17.260	0.373	0.056
2002	452.619	0.308	29.786	17.344	0.370	0.056
Total	437.708	0.323	27.533	16.263	0.369	0.056

Notes: Business tax (BT) multiplier (in %), surface area (in ha p.c.), income tax share (in 1,000 euro p.c.), employees (p.c.) (municipal level) and income of private households (in 1,000 euro p.c.), GDP (in 1,000 euro p.c.); number of observations: 21 "big" municipalities p.a. Own calculations based on data from IT.NRW, Regional Database Germany and the Federal Employment Agency.

Chapter 3

Does local transfer dependency weaken fiscal performance

Abstract

This paper investigates whether dependency of local governments on transfers from higher levels of government negatively affects local fiscal outcomes, using a disaggregated panel dataset comprising more than 5,000 German municipalities. Both conventional fixed effect as well as two-stage least squares estimates confirm a negative impact of transfer dependency on the local budget balance. The effect is aggravated when transfer dependency coincides with horizontal fiscal imbalances or easy local access to borrowing. A decomposed analysis of dependency on different transfer types suggests that shared taxes and conditional transfers are responsible for the adverse budgetary effect, while reliance on unconditional transfers leaves local fiscal performance unaffected.

3.1 Introduction

Transfers to lower levels of government are a cornerstone of (fiscal) federalism. But wherever there are transfers, there is transfer dependency, or, equivalently, vertical fiscal imbalance. Both terms indicate that the government level in question is unable to cover all of its expenses with own revenues.

While some degree of transfer dependency is warranted for tax and spending efficiency as well as equity reasons (Boadway 2006; Boadway 2007; de Mello 2000; Oates 1999), a growing body of literature has shown its harmful effects. Indeed, reliance on transfers as opposed to own revenues has been blamed for larger deficits (de Mello 2000;

de Mello 2007; Eyraud and Lusinyan 2013; Foremny 2014; Rodden 2002), fiscal crises (Rodden et al. 2003), a lower GDP per capita (Blöchliger 2014), bigger government (Guo 2008), higher debt (Aldasoro and Seiferling 2014), lower government efficiency (Boetti et al. 2012; Geys et al. 2010), less skilled politicians (Bordignon et al. 2013) or even higher inequality (Hummel and Seiferling 2015). A loss of accountability as well as common pool problems along with soft budget constraints and bailout expectations are usually identified as the culprits of these undesirable outcomes (see for example Inman [2003] and Rodden and Eskeland [2003]).

The existing empirical, quantitative literature shares a major potential flaw. In all of the aforementioned cases, the analysis is carried out using aggregate measures of subnational transfer dependency at the country level. Aggregating entire state or local sectors into one unit of analysis conceals a vast amount of within-country variation in vertical fiscal imbalance. Federal states in particular feature diverse institutional and fiscal landscapes that create such variation. As pointed out by Eyraud and Lusinyan (2013) and Rodden (2002), among others, using disaggregated data would therefore be desirable. This paper aims to fill this gap and to verify the results of the existing literature with an in-depth within-country econometric analysis.

As recognized by Eyraud and Lusinyan (2013), Coen-Pirani (2013) and Rodden (2002), vertical fiscal imbalance should be considered an endogenous outcome, which questions the reliability of estimation results in most of the literature. Following Eyraud and Lusinyan (2013), this paper employs an instrumental variable approach to rule out biases from endogeneity. Innovative instruments suitable to the German institutional context are identified.

International country-level analyses also suffer from comparability concerns (Bird and Tarasov 2004; Sharma 2012), which can be avoided in the present paper by limiting the focus to one country. Moreover, authors typically agree that it is important to distinguish different types of grants, such as conditional and unconditional grants, and to carefully assess the classification of shared taxes as either own revenues or transfers. However, few authors are able to contrast estimation results obtained with different measures of transfer dependency within their study due to data limitations. Instead, one measure is presented which is deemed superior to alternative specifications based on the author's assessment. This paper adds to efforts at understanding the role of different types of transfers by decomposing transfer dependency and comparing the impact of each component on local deficits.

In this paper, I investigate the impact of vertical fiscal imbalance in the financing structure of German municipalities on municipal deficits. Germany constitutes an ideal setting for this purpose. As one of the world's leading federal states, Germany's fiscal structure is characterized by shared taxes and transfers to the state and local level as major pillars of subnational finance. While the states derive tax revenue almost exclusively from shared taxes, municipalities have more substantial tax autonomy. The elements of local revenues are uniform across the country, but sizable variation in transfer dependency results from the differing generosity of transfer systems and differences in spending decentralization in the 13 territorial states, as well as differing tax capacity among the municipalities.

I focus on local deficits for two reasons. First, the negative relationship between vertical fiscal imbalance and deficits has been asserted by the cross-country literature. It thus constitutes a suitable testing ground to verify the conclusions drawn with a more detailed analysis. Second, the increasing political relevance of subnational deficits demands additional explanatory efforts to inform policy choices. In the context of recent debt crises, knowing how to prevent fiscal aberrations at all levels of government is crucial. While Germany is rarely regarded as a "problem country" when it comes to public debt sustainability, the fiscal woes and debt burdens of municipalities have long been prominent on the agenda of German policymakers (Gröpl et al. 2010; Heinemann et al. 2009; see also Chapter 4).[1] Internationally, fiscal decentralization is often recommended and has been employed as a tool for enhancing efficiency in the delivery of public goods and services, thereby improving public finance and fiscal performance (Ahmad and Brosio 2006; Blöchliger 2013). Indeed, the extent of fiscal decentralization itself has been shown to have a bearing on fiscal balances (de Mello 2000; Neyapti 2010). But to ensure that the hopes attributed to decentralization are not disappointed, it has to be done right – for instance by accompanying decentralization on the expenditure side with decentralization on the revenue side.[2] In Europe such lessons will become ever more important if and when fiscal integration advances in the European Union.

The results confirm that transfer dependency negatively affects local fiscal outcomes. Its effect is particularly damaging when municipalities enjoy greater borrowing autonomy and/or the federal state in which the municipality is situated is characterized by more

[1] This is despite the fact that the local level as a whole usually runs a budget surplus.

[2] In addition, the success of fiscal decentralization in aiding fiscal discipline requires a supportive institutional environment including well-enforced fiscal rules (Neyapti 2013).

pronounced horizontal fiscal imbalances. Furthermore, the impact of transfer dependency's components is not uniform. While both dependency on shared taxes and conditional transfers are found to dampen the budget balance, unconditional transfers do not exert statistically significant adverse effects in the sample. The results are robust across a number of different specifications.

In sum, the contribution of this paper is twofold. First, I add to the understanding of local deficits in Germany, pointing out one determinant of higher deficits that has not received much attention in the German context so far. Here, transfers are usually looked upon quite favorably and a large share of transfers is tied to objective, supposedly incentive-compatible criteria. Second, I offer methodological refinements to test the impact of vertical fiscal imbalance on local deficits: Estimates are based on within-variation at the local level in a dataset covering more than 5,000 municipalities in all German territorial states. An IV approach ensures that estimation results are not biased by the potential endogeneity of the transfer dependency measure. Three decomposed measures of vertical fiscal imbalance are computed and tested empirically. The role of shared taxes, unconditional and conditional transfers can thus be differentiated.

Section 3.2 explains the measures of transfer dependency and its components used in this paper and illustrates their empirical evolution in Germany since the late 1990s. Section 3.3 elaborates why transfer dependency should have an effect on local fiscal performance from a theoretical perspective, putting forward a number of hypotheses to be tested in the ensuing empirical analysis. Section 3.4 explains the empirical strategy, the results of which are presented in Section 3.5. Section 3.6 concludes.

3.2 Transfer dependency in Germany

In this section, the concept and appropriate measures of transfer dependency are discussed and applied to German municipalities (Section 3.2.1). Afterward, the empirical evolution of German municipalities' transfer dependency since 1998 is shown (Section 3.2.2).

3.2.1 Measuring transfer dependency

Germany is a federal country consisting of 16 states. Three of these, the so-called city-states, do not have a separate municipal level and are excluded from the following analysis. The remaining 13 "territorial" states comprise more than 11,000 municipalities, with the

number of municipalities per state varying between 52 (Saarland) and 2,305 (Rhineland-Palatinate). German municipalities draw revenue from three main sources: Taxes, fees and charges, and transfers from higher levels of government.

Vertical fiscal imbalance is loosely defined as a "mismatch between revenues and expenditures at different levels of government" (Sharma 2012, p. 102). It is often – as in this paper – used synonymously with the term "transfer dependency", which is commonly measured as the amount of transfers received by subnational entities relative to their total spending or revenue (Rodden 2002). Since transfers make up a significant share of local revenue of German municipalities,[3] it is evident that they "suffer" from a vertical fiscal imbalance.

The difficulty in operationalizing transfer dependency lies in the necessary differentiation between transfers and own revenues (Rodden 2002). For instance, it is unclear whether shared taxes, over which subnational governments do not enjoy tax autonomy, should be counted among transfers or own revenues. Moreover, unconditional and conditional grants may have to be distinguished due to their potentially different incentive effects.

Among the revenue sources of German municipalities, some can be classified as own revenue with great certainty. First, fees and charges, which are levied under the authority of each municipality for their services ranging from waste management to childcare services, contribute to own revenues. Second, there are a number of taxes under municipal control. The business tax and the property tax are by far the most important municipal taxes. In 2013, they accounted for 15.8 percent and 5.8 percent of aggregate municipal income, respectively. While the tax bases for both of them are defined at the federal level, the tax rates are defined locally. Hence, each year every municipality sets its own tax rate. In addition, municipalities can set and collect local excise and consumption taxes. They may also introduce new excise taxes as long as they are not comparable to existing federal taxes. However, revenue from excise and consumption taxes remains negligible relative to that from the business and property tax.[4]

Shared taxes are more problematic. Municipalities receive 15 percent of national income tax revenue as well as 2.2 percent of national VAT revenue. The rest is distributed among the federal level and the states. Municipalities do not have authority over tax

[3]In 2014, transfers accounted for 59 percent of total local current revenue.

[4]Such taxes account for roughly 1 percent of municipal revenue (Rehm and Matern-Rehm 2010).

bases or tax rates of the VAT or income tax. This lack of autonomy indicates that a classification as grants instead of own revenue is a priori more appropriate. The share of these taxes accruing to individual municipalities is related to municipal characteristics and circumstances, as defined by federal law. For the income tax, individual shares depend on the taxable income of the inhabitants of each city, which is cut off at a threshold.[5] The number of (working) inhabitants and their income structure are thus decisive. The distribution of VAT shares depends on a battery of indicators, including the local number of employees, the amount of salaries subject to social security contributions and past shares of business tax revenue. Local VAT revenues thus reflect local economic activity. It is questionable whether local revenue from these two sources has the same effects as revenue from "pure" grants.

Finally, municipalities receive transfers from state governments.[6] The bulk of transfers is paid out as part of fiscal equalization schemes implemented in all territorial states.[7] Apart from their equalizing role, fiscal equalization transfers fulfill a prominent financing function as most municipalities are unable to cover their expenses with taxes and fees. Among the transfers, unconditional and conditional transfers can be distinguished. The majority of transfers are unconditional, with the so-called *Schlüsselzuweisungen* (general fiscal equalization transfers) accounting for most of the transfer volume. Most conditional transfers are investment-related, but there are also earmarked grants for current purposes. Both conditional and unconditional transfers do undoubtedly not constitute own revenues. At the same time, they might have differing incentive effects. After all, spending authority might be more decisive than revenue raising authority in shaping municipal incentives.

Three components of transfer dependency emerge from the above discussion. In each case, the particular type of dependency is measured as the share of the respective transfers in total local current revenue. Transfer dependency is defined relative to revenues as opposed to expenditures to avoid a spurious relationship between transfer dependency

[5]The threshold is currently set at a yearly income of 35,000 euros. It was introduced to avoid incentives for policies to attract rich households and marginalize poor ones (Rehm and Matern-Rehm 2010).

[6]Direct financial links between the federal and municipal level are ruled out by the federal constitution. This ban notwithstanding, there are de facto many federal transfers aimed at municipalities. For instance, the federal level is responsible for social welfare support for pensioners and, most recently, becoming more involved in refugee assistance. Due to the constitutional setup however, any such transfers must be channeled through state budgets, see Bertelsmann Stiftung (2015). The states then typically determine how to distribute federal transfer money among their municipalities.

[7]See Chapter2 for a detailed presentation of municipal fiscal equalization in Germany.

and local deficits in the ensuing analysis.[8] The focus on the current budget (*Verwaltungshaushalt*) avoids biases due to one-off events that are typical of the capital budget (*Vermögenshaushalt*).

In particular, the first measure is

$$Dep_{ST,i,t} = \frac{ITS_{i,t} + VATS_{i,t}}{GREV_{i,t}} \tag{3.1}$$

where subscripts i and t refer to municipality i in year t, ST :=shared taxes, $Dep_{ST,i,t}$:=dependency on shared taxes, $ITS_{i,t}$:=income tax share, $VATS_{i,t}$:=VAT share and $GREV_{i,t}$:=gross current revenue.

The second component measures the dependency on unconditional transfers ($UT_{i,t}$:=unconditional current transfers, $Dep_{UT,i,t}$:=dependency on unconditional transfers).

$$Dep_{UT,i,t} = \frac{UT_{i,t}}{GREV_{i,t}}. \tag{3.2}$$

Finally, the third measure focuses on conditional transfers.

$$Dep_{CT,i,t} = \frac{CT_{i,t}}{GREV_{i,t}} \tag{3.3}$$

where $CT_{i,t}$:=conditional current transfers and $Dep_{CT,i,t}$:=dependency on conditional transfers.

Together, the three components make up transfer dependency as a whole ($Dep_{T,i,t}$):

$$Dep_{T,i,t} = Dep_{ST,i,t} + Dep_{UT,i,t} + Dep_{CT,i,t} = \frac{ITS_{i,t} + VATS_{i,t} + UT_{i,t} + CT_{i,t}}{GREV_{i,t}} \tag{3.4}$$

3.2.2 Evolution of local transfer dependency in Germany

Despite common local revenue sources, there is significant variation in local transfer dependency across Germany. Figure 3.1 shows average local transfer dependency over 1998 to 2013, as measured by the transfer dependency indicator and its three components pre-

[8] A definition relative to expenditures would imply classifying local net borrowing, i.e. local deficits, as either own revenues or transfers, thus making the deficit part of the transfer dependency variable by construction.

sented in Section 3.2.1, by federal state. Data on yearly municipal gross current revenue and transfers were obtained from a combination of sources. Data from 1998 to 2006 were obtained from the Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder (*Forschungsdatenzentren der Statistischen Ämter des Bundes und der Länder* [FDZ]).[9] Data on the years from 2007 to 2013 were requested separately from each of the 13 state statistical offices.[10] The dataset is limited to non-associated municipalities (*verbandsfreie/amtsfreie Gemeinden*), i.e. municipalities not belonging to a municipal association, to ensure municipalities' administrative statuses and responsibilities are comparable. Due to gaps in data collection and provision, territorial reforms and budgeting reforms in some of the federal states, the resulting panel dataset is unbalanced.[11] State codes and details on the panel structure are given in Table 3.9 in the appendix to this chapter.

[9]More specifically, the municipal-level data comes from the the municipal financial statement statistic (*Jahresrechnungsstatistik der Gemeinden und Gemeindeverbände* 1998-2006).

[10]Not all statistical offices were able to provide municipal-level data for the requested time period based on the territorial status of that time.

[11]Territorial reforms took place above all in the New Länder and greatly reduced the number of municipalities over time. Budgeting reforms in all federal states led to the introduction of accrual budgeting at the local level. However, time frames are not uniform and in some states, municipalities retain the option of continuing cash-based accounting. For municipalities in states that have introduced compulsory accrual accounting, nationally comparable revenue statistics are no longer provided by the Regional Database Germany.

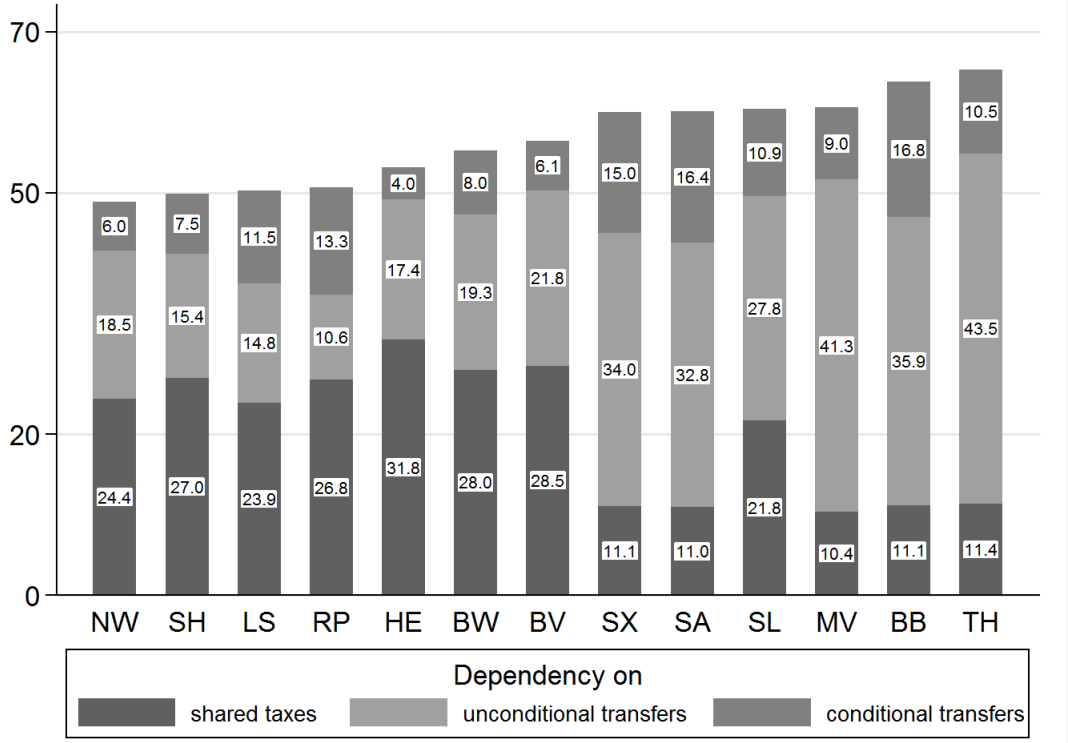

Figure 3.1: Average transfer dependency (percent, average over 1998-2013)

Source: Own calculations based on data from the FDZ and data provided by the statistical offices of the Länder.

As can be seen in Figure 3.1, reliance on different types of transfers is very heterogeneous across states. Shared taxes make up 20.5 percent of total current revenues on average across states. The average share of unconditional and conditional transfers is 25.6 and 10.4 percent, respectively. Great differences appear across states with respect to shared taxes and unconditional transfers. In the New Länder, shared taxes make up only roughly 11 percent of current revenues, while they contribute around a quarter of revenues in the Old Länder.[12] Given that local tax shares reflect economic conditions, this finding is indicative of the much lower economic strength found in the former GDR. Apparently, the New Länder try to compensate the lack of tax revenue by providing relatively more unconditional transfers to municipalities, which thus contribute a much larger share of revenues than in the West. The contribution of conditional transfers to the lo-

[12]New Länder: Brandenburg; Mecklenburg-Vorpommern; Saxony; Saxony-Anhalt; Thuringia. Old Länder: Baden-Württemberg; Bavaria; Hesse; Lower Saxony; North Rhine-Westphalia; Rhineland-Palatinate; Saarland; Schleswig-Holstein.

cal revenue mix varies between 4 percent in Hesse and 16.8 percent in Brandenburg. It shows no clear East-West pattern. However, municipalities in the New Länder are overall more dependent on transfers as opposed to own revenues than those in the Old Länder. The only exception is the small western state Saarland, where transfers made up 60.4 percent of current revenues on average during the sample period, which falls within the range of transfer dependency values of the New Länder. Municipalities were on average least dependent on transfers in North Rhine-Westphalia (48.9 percent) and most transfer dependent in Thuringia (65.4 percent).

Table 3.1 provides the numbers behind Figure 3.1, including total transfer dependency.

Table 3.1: Average transfer dependency (percent, average over 1998-2013)

Federal state	Dep_{ST}	Dep_{UT}	Dep_{CT}	Dep_{T}
Baden-Württemberg	28.0	19.3	8.0	55.3
Bavaria	28.5	21.8	6.1	56.4
Brandenburg	11.1	35.9	16.8	63.8
Hesse	31.8	17.4	4.0	53.2
Lower Saxony	23.9	14.8	11.5	50.3
Mecklenburg-Vorpommern	10.4	41.3	9.0	60.6
North Rhine-Westphalia	24.4	18.5	6.0	48.9
Rhineland-Palatinate	26.8	10.6	13.3	50.7
Saarland	21.8	27.8	10.9	60.4
Saxony	11.1	34.0	15.0	60.0
Saxony-Anhalt	11.0	32.8	16.4	60.2
Schleswig-Holstein	27.0	15.4	7.5	49.9
Thuringia	11.4	43.5	10.5	65.4
Total	20.5	25.6	10.4	56.5

Source: Own calculations based on data from the FDZ and data provided by the statistical offices of the Länder.

Figure 3.2 shows the evolution of the components of local transfer dependency in the Old (top panel) and New Länder (bottom panel) from 1998 to 2013.[13]All measures of transfer dependency exhibit significant variation within states over time. No clear nationwide trend is discernible from Figure 3.2. In the New Länder however, reliance on

[13]Tables 3.10 to 3.12 in the appendix list the corresponding yearly values for each transfer dependency component.

unconditional transfers appears to have decreased over time. Yearly fluctuations in local transfer dependency are mostly due to economic volatility, the sensitivity of local (and state) revenues to economic conditions and, to some extent, local-state bargaining. It is also clear from Figure 3.2 that the observed differences in the roles of unconditional transfers and shared taxes have been present since the beginning of the sample period in 1998: Municipalities in the East have consistently had to rely more on unconditional transfers and less on shared taxes compared to municipalities in the West.

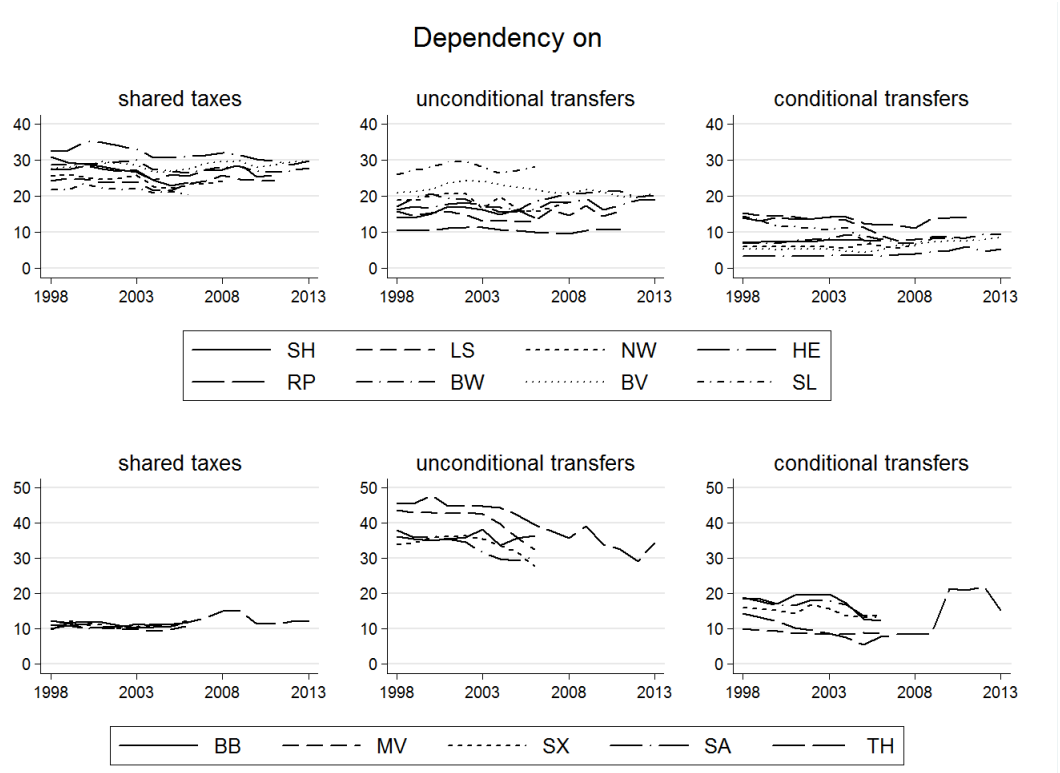

Figure 3.2: Transfer dependency over time, 1998-2013

Source: Own calculations based on data from the FDZ and data provided by the statistical offices of the Länder.

In sum, transfer dependency is a broad concept that can be operationalized using a variety of different measures. The definition of own revenues and the corresponding choice of the transfer dependency measure are crucial in assessing vertical fiscal imbalances. Moreover, transfer dependency can be decomposed according to the types of transfers received by subnational governments. Each measure paints a different picture of intergovernmental fiscal relations and subnational fiscal autonomy. Within a country like Ger-

many, substantial variation in transfer dependency exists both across states and over time. Moreover, the composition of transfers to local governments shows persistently different patterns across states.

3.3 Transfer dependency's effect on fiscal performance

Theoretical expectations and the findings from existing literature lead to a number of hypotheses on the relationship between transfer dependency and fiscal performance. Fiscal performance is discussed in Section 3.3.1. Section 3.3.2 develops the hypotheses to be tested in the empirical analysis for the local level in Germany.

3.3.1 Fiscal performance

Local deficits are used as a proxy for fiscal performance in this paper. Mirroring the definition of transfer dependency, the analysis is limited to the deficit in the current budget, excluding the capital budget. This avoids biases due to one-off events.

The deficit is the result of municipal revenue and spending. It is important to note that neither one is fully determined by the municipality in question. Transfer dependency would not be an issue if municipalities had full authority over their revenues and relied only on own-source revenues. But local autonomy is also constrained on the spending side. Municipalities have the constitutionally guaranteed right to regulate their own affairs independently, to define their own tasks, and to carry out the spending activities that go along with them. However, the federal and state level can mandate particular local tasks or define standards that municipalities must meet in the provision of local public goods and services. They can also delegate their own tasks to the local level. Accordingly, local government functions and corresponding spending activities take three forms. First, there are voluntary local tasks. Municipalities can decide if and how to fulfill them. Typical examples include the provision of cultural services, sports grounds or youth centers. Second, there are mandatory local tasks. Municipalities are obliged to fulfill these tasks. They may decide on their own how to fulfill them, but often need to respect minimum standards defined by higher levels of government. The provision of schools, local public roads or sewage disposal are examples of such tasks. Finally, there are delegated tasks.

Municipalities participate in the provision of federal or state services. The latter are fully defined by the delegating level of government. The provision of passports to citizens is such a task; it is carried out by municipalities as mandated by the federal level.

One might wonder if these exogenous constraints leave much scope for local policymakers to influence municipal deficits, and if the deficit is still a valid measure of local fiscal performance. The answer must be affirmative. On the spending side, all municipalities retain voluntary tasks, which are the easiest target for spending cuts when fiscal performance needs to be improved. In case of mandatory tasks, municipalities may have to respect minimum standards, but are otherwise free to decide how much resources to devote to task fulfillment. And even delegated tasks can be fulfilled with varying degrees of efficiency. Nonetheless, acknowledging the fact that municipalities in some states face more mandated spending responsibilities than in others is important. That is why the level of spending decentralization in each state is an essential control variable in the regression analysis (see Section 3.4). On the revenue side, municipalities have authority over fees and charges, property and business taxes, and some less significant taxes (see Section 3.2.1). These revenue sources represent essential levers of local fiscal performance. Transfers do play an important role in municipal budgets and may be decisive in shaping local fiscal performance – but that is precisely the interest of this paper. The empirical analysis will show whether changes in transfer dependency affect local fiscal performance.[14]

3.3.2 Hypotheses on transfer dependency and fiscal performance

H1: *Lower transfer dependency improves fiscal performance. Higher transfer dependency depresses fiscal performance.*

H1 summarizes the main prediction concerning transfer dependency from the existing theoretical and empirical literature. Greater reliance of municipalities on own revenue sources as opposed to transfers from higher levels of government is expected to improve fiscal performance, as measured by the local deficit, and vice versa. Theoretical explanations as to why this might be the case originate from several interrelated strands of literature.

Vertical fiscal imbalances mean that there is a wedge between the costs and benefits of public sector provision at the local level, which creates a common pool problem (see

[14]To rule out any mere mechanical link between transfer dependency and local deficits, the analysis will be backed up by an instrumental variable estimation. See Section 3.4 for details.

Raudla [2010] for a review of the budgetary commons literature): From a municipal perspective, transfers form a common pool of resources. Each recipient municipality benefits directly from transfer revenue, but the costs for raising this revenue are shared collectively. Subnational governments may therefore underutilize their own tax bases at the expense of the common pool of sharable revenues. This allows them to shift part of the burden of local service provision from their taxpayers to taxpayers elsewhere in the economy, creating a potential political payoff (de Mello 2000). Given the "tragedy of the commons" (Hardin 1968), this results in overfishing of the common revenue pool.

Another useful starting point for thinking about possible reasons for detrimental effects of transfer dependency is the literature on the flypaper effect (see Bailey and Connolly [1998] for a review). The flypaper effect refers to the empirical phenomenon that lump-sum grants to governments have a much greater stimulatory effect on government spending than an increase of local individual incomes of the same amount, contrary to what traditional economic theory would suggest.[15] There are a number of competing theoretical explanations for this effect, one of which is Oates' (1979) fiscal illusion model. In this model, grants create a fiscal illusion on the part of local voters who believe that the cost of goods and services provided by the local government is less than it actually is.[16] Local government officials, on the other hand, are assumed to be output maximizers. Due to this setup, the resulting level of output (and spending) is excessive. It is easy to see how greater dependence on grants from higher levels of government would thus, over time, contribute to an increasingly untenable fiscal stance. One might add that in practice, not only voters but also local government officials themselves might suffer from fiscal illusion, making the problem worse.

When subnational entities rely on transfers to fund a large share of their spending, this dependence contributes to moral hazard and soft budget constraints.[17] Under soft budget constraints, local governments are able to or believe to be able to extract additional funds from the center should they run into fiscal difficulties. Thus, they trust that the central government (or, as in the present case, the state government), will ultimately bear the costs of their expenditure. Such bailout expectations induce undesirable fiscal behavior

[15]The flypaper effect has been summarized as "money sticks where it hits", see for example Courant et al. (1979).

[16]The illusion occurs because local voters consider average instead of marginal tax prices of local services.

[17]The term "soft budget constraint" was originally introduced by Kornai (1979) to describe the behavior of state-owned enterprises in socialist economies.

in the form of overspending, undertaxation, overborrowing or delayed fiscal adjustment (Rodden et al. 2003).

When fiscal problems arise, local governments that are highly dependent on transfers can claim that the state government is to blame (Vigneault 2007). The fiscal woes appear to be due not to irresponsible local fiscal policy, but to insufficient transfers. When local governments have limited power over their revenue, voters and creditors are equally likely to direct pressure to the state government instead of punishing local politicians at local elections. The lack of accountability created by transfer dependency thus contributes to bailout expectations.

All of these problems – common pool problems, flypaper effect, soft budget constraints and lack of accountability – are, of course, intertwined, with each strand of literature offering a complementary view on problematic effects of intergovernmental transfers.

H2: *The effect of transfer dependency is contingent on other factors.*

H2.1: *The effect of transfer dependency is stronger when local borrowing autonomy is high.*

Limiting borrowing autonomy is one way to counter soft budget constraint problems caused by transfer dependency (Inman 2003; Rodden and Eskeland 2003). Such hierarchical mechanisms can take various forms such as completely prohibiting lower level borrowing, limiting the use of debt or adopting balanced budget rules. As shown by Rodden (2002) and Eyraud and Lusinyan (2013) in a cross-country context, borrowing autonomy is an important mediating factor in shaping the impact of transfer dependency on fiscal outcomes. Fiscal performance is expected to be worst when high reliance on transfers and ample borrowing autonomy coincide.

For municipalities in Germany, borrowing is officially limited to investment purposes while debt for consumption purposes is ruled out. Correspondingly, local government laws in all states contain balanced budget rules for municipalities. Despite this common formal framework, effective credit access of local governments varies greatly across states and over time. In some states, current deficits are routinely funded by so-called liquidity credits (*Liquiditätskredite*). In Chapter 4, we develop an index of local credit access reflecting effective local borrowing autonomy in all 13 territorial states in each year from 1998 to 2013. This index is used in the empirical analysis of Section 3.5.

H2.2: *The effect of transfer dependency is stronger when horizontal fiscal imbalances are large.*

Differences in resources available to subnational governments are called horizontal fiscal imbalances (Bird and Tarasov 2004). More generally, horizontal fiscal imbalances describe a situation of interregional disparities and heterogeneity between subnational entities. For the cross-country case, Eyraud and Lusinyan (2013) find that transfer dependency (or vertical fiscal imbalance, as they call it) is more detrimental when countries are characterized by large horizontal fiscal imbalances, measured as per capita income disparity or income level disparity within the country. Variation in population size has no significant effect according to their results. In the present context, differing endowments of population or income are also judged to be particularly relevant. In states characterized by large population or income differentials, fiscal equalization is likely to play a larger role, which could discourage fiscal discipline. Moreover, heterogeneous states may be more vulnerable to bailout pressures from individual localities because the fiscal performance (and possible fiscal wrongdoings) of each municipality is more difficult to judge objectively when each municipality can claim to be subject to unique circumstances.

H2.3: *The effect of transfer dependency is stronger in election years.*

Politics may also interfere with transfer dependency's effect on local fiscal outcomes along the lines of political budget cycles, which suggest higher spending and lower taxes in election years.[18] In years where state governments face general elections, they may be more vulnerable to the fiscal demands of municipalities under their jurisdiction. If municipalities were forced to cut spending and service provision, the local population may be tempted – or state governments may fear the population might be tempted – to attribute such negatively felt outcomes to the state government and punish them at the upcoming election. Local governments which rely on transfers to finance a large part of their expenditure may be more able to pressure state governments into turning a blind eye on local fiscal indiscipline when the latter hope to secure reelection. Thus, the effect of transfer dependency on local deficits should be stronger in election years, as found by Eyraud and Lusinyan (2013) in their cross-country analysis.

[18]See, for example, Alesina and Roubini (1992) who find an opportunistic cycle in transfers.

H2.4: *The effect of transfer dependency is stronger when spending is more decentralized.*

Finally, the way transfer dependency interacts with the local budget balance may be affected by the distribution of spending between the local and state level in the state in question.[19] Lacking own resources in the local revenue mix may be particularly damaging when municipalities face extensive spending responsibilities.

Extensive spending decentralization is especially problematic when it is the result of delegation instead of "real decentralization". A large share of local spending in total government spending within a state usually results when state governments delegate tasks to the local level, while rules and standards governing the task in question are defined at the state or even national level. Thus, a lack of autonomy on the revenue side coincides with a lack of autonomy on the spending side. In Germany, social welfare spending is a case in point: To a large extent, standards are set by federal law, but execution is often up to the Länder, who devolve responsibilities to municipalities and counties to varying degrees. Accountability problems are exacerbated when the distribution of spending responsibilities is unclear to voters, which is often the case when states devolve the execution of state responsibilities to the local level.

H3: *The effect of dependency on shared taxes, unconditional and conditional transfers differs in strength.*

As mentioned in Section 3.2.1, shared taxes can be viewed as transfers because municipalities do not have authority over the legal definition of their tax base or tax rate. Nevertheless, the apportionment of shared taxes to municipalities is related to local economic activity. To some extent, the municipality gets resources back that were generated by its population. This makes shared taxes fundamentally different from "pure" grants. Conditional and unconditional grants undoubtedly do not constitute own revenues, but their effect on local deficits might also differ.

The reasons why different transfer types might affect local deficits differently can be discussed along two dimensions. First, traditional economic theory tells us that grants have both income and substitution effects. Second, it matters where each transfer type falls on the continuum of rules versus discretion.

[19] Eyraud and Lusinyan (2013) test this proposition at the country level, with spending decentralization measured as the share of subnational own expenditure in general government expenditure.

Any type of transfer changes local government income and thus results in income effects. Local government spending will be higher than it would have been without the transfer, ceteris paribus.[20] Lump-sum grants without conditionality or matching requirements have only income effects. Shared taxes and unconditional transfers fall into this category. Matching grants have income and substitution effects. They change local price ratios and lead to more pronounced increases in spending on the program in question. Some conditional grants have such a matching dimension. However, matching grants are typical of the capital budget and not the current budget, which is the focus of the present analysis. But even without a matching requirement, conditional transfers may have substitution effects. They occur if local government spending in the area on which the transfer money must be spent was previously below the amount of the transfer received. The income and substitution effects predicted by conventional economic theory should a priori not lead to higher deficits, because governments would in theory always respect their budget constraints, refrain from overspending and allocate resources efficiently given the constraints posed by grant design. Nevertheless, considering income and substitution effects reveals an important distinction: Shared taxes and unconditional transfers do not change price ratios and do not alter the relative allocation of government spending. Conditional transfers, on the other hand, may distort local government behavior, which could in practice contribute to local overspending.

Another important reason for potentially different incentive effects is the trade-off between rules and discretion. The degree to which transfers are governed by rules, the transparency of these rules and the content of the rules matter for fiscal performance (see, for example, Rodden and Eskeland [2003], Evers [2012], Neyapti and Bulut-Cevik [2014] and Sanguinetti and Tommasi [2004]). The ability of local governments to influence the amount of transfers they receive is decisive (Hunter 1974). Dependence on transfers of any type increases the perception that state governments are ultimately responsible for local fiscal trouble, as suggested by H1. This perception might be bolstered if transfers representing suitable bailout channels are readily available. Arguably, transfers that are paid according to strict and transparent rules that are not easily manipulated by either the local or state government do not constitute likely bailout channels. Instead, some discretion over transfers by the state government is required. Otherwise, the state govern-

[20] In the special case of negative income elasticity of the demand for public goods, theory predicts a decrease in government spending, see Hyman (2014).

ment could not be pressured into raising these transfers in times of fiscal shortages and would not be vulnerable to bargaining and bailout demands.

In the German context, shared taxes are the type of transfer over which state governments enjoy the least amount of discretion. The fact that municipalities should receive income and VAT shares is enshrined in the federal constitution. The details of the distribution mechanism among the federal, state and local level are determined by federal law. Shared taxes do not appear amenable to bailout pressures.

In contrast, unconditional and conditional transfer are almost exclusively designed under state authority, with considerable bargaining with local actors. Federal transfers to municipalities are negligible in comparison.[21] The vast majority of unconditional transfers to municipalities is part of state municipal fiscal equalization schemes. Fiscal equalization transfers are meant to reduce differences in local capacities to provide public goods. In each state, standardized measures of fiscal need and fiscal capacity are compared and gaps in fiscal capacity are partially filled with transfers. The exact rules pertaining to the calculation of fiscal need, fiscal capacity, the degree of equalization etc. differ from state to state. The fiscal equalization schemes are very elaborate and typically ensure that the calculation of fiscal need does not create incentives for manipulation by municipalities.[22] Similarly, the design of fiscal capacity measures preserves incentives for local tax effort through the use of standardized tax multipliers (see Chapter 2). Consequently, it can be expected that fiscal equalization transfers contribute only moderately to soft budget constraint problems. Even so, the mere existence of fiscal equalization may hinder the economic and fiscal development of poorer regions (McKinnon 1995). Moreover, unconditional transfers are not made up entirely of rules-based fiscal equalization transfers. In particular, special need grants (*Bedarfszuweisungen*) deserve note. Such grants can be requested by municipalities experiencing unforeseeable, extraordinary hardship such as natural disasters. Increasingly however, states use them as tools to support fiscal consolidation efforts of indebted municipalities. States enjoy great discretion when granting such transfers, which makes them suitable potential bailout channels.[23]

[21]Direct fiscal transfers from the federal to the local level are even prohibited by the constitution. Federal transfers are thus channeled through each state (see Footnote 6).

[22]For this purpose, fiscal need is based on objective criteria such as the number of inhabitants, surface area, social welfare recipients, school children etc. See Chapter 2 and Section 3.2.1.

[23]The data do not allow distinguishing fiscal equalization transfers and special need grants in the empirical analysis.

Similarly, conditional transfers are characterized by state discretion. Conditional transfers are granted to individual municipalities with some regularity for purposes such as sewage management, flood control or childcare services. As with special need grants, however, there is a tendency to grant ad hoc conditional transfers for budget consolidation purposes. As a whole, conditional transfers are perhaps the least rules-based transfers received by German municipalities, such that a large share of conditional transfers in local revenue should be particularly harmful to fiscal outcomes. In addition and in contrast to shared taxes and unconditional grants, conditional grants reduce local spending autonomy, thereby limiting local accountability and the extent to which local expenditures reflect local policy choices (Bird and Tarasov 2004). Instead, municipalities become mere spending agents through delegation from the state level (de Mello 2000).

3.4 Empirical strategy

The hypotheses derived in Section 3.3.2 are tested in a fixed effect model relating the local deficit (or surplus) to local transfer dependency, interaction terms and control variables. The resulting regression model takes the following form:

$$deficit_{i,t} = \beta_1 Dep_{T,i,t} + \delta \mathbf{X_{i,t}} + \theta \mathbf{Y_{c,t}} + \lambda \mathbf{Z_{s,t}} + \alpha_i + \Phi_t + \varepsilon_{i,t} \tag{3.5}$$

where $deficit_{i,t}$ represents the current deficit of municipality i in year t, relative to its population. $Dep_{T,i,t}$ designates total transfer dependency measured by the sum of shared taxes, unconditional and conditional transfers relative to gross current revenues (see Section 3.2). $Dep_{T,i,t}$ captures the extent of the common pool problem, the softness of the local budget constraint, the strength of bailout expectations etc., which may depress local fiscal performance. The higher the share of transfers in total revenues, the more others have to pay to finance a municipality's revenue, the softer is the municipal budget constraint and the stronger are municipal bailout expectations. From H1, β_1 is expected to be positive.

A number of covariates is introduced and tested in Equation 3.5 to account for other potential intervening factors. Vector $\mathbf{X_{i,t}}$ designates municipal-level controls (local population, the dependency ratio[24], the number of in-commuters per capita and population

[24]The dependency ratio is calculated as the share of under 18- and over 65-year-olds in the total population.

density). The local population is included to account for the fact that larger cities might face softer budget constraints, similar to the argument advanced in H2.2. Population-related variables also control for the fact that spending necessities may depend on the size and composition of the local population. Local economic strength, which contributes to a favorable fiscal position, is reflected by the number of in-commuters. Finally, fiscal pressures due to maintenance costs might also result from a lower population density.

$\mathbf{Y_{c,t}}$ contains county-level controls (GDP per capita, the disposable income of private households per capita, the number of households eligible for social welfare benefits per capita and an indicator variable for a left majority at the latest state parliamentary elections) while $\mathbf{Z_{s,t}}$ denotes state-level controls (spending decentralization[25] and state budget balance[26]). GDP and disposable income per capita again reflect local economic strength.[27] The number of households eligible for social welfare benefits not only indicates a lack of economic strength, but also accounts for specific local spending needs. Municipalities in Germany are responsible for the payment of residence and heating costs for households receiving unemployment benefits.[28] The indicator variable for a left majority proxies the ideological stance of the local administration, which might influence its fiscal policies. Spending decentralization at the state level captures the role of municipalities in executing policies in the state as a whole. For given values of transfer dependency, it might be more difficult for municipalities to balance their budgets when they are responsible for a wider range of tasks. The fiscal situation of local governments might also be affected by the state's fiscal position, which is why the state budget balance is included.

The specification also controls for municipal fixed effects (α_i) and year dummies (Φ_t). Fixed effects ensure that estimation results are not biased by municipality-specific, time-constant factors. For instance, the geographic position of a municipality, the mentality of its people and political leadership or its economic profile and biggest employers might all have an impact on fiscal performance, which is filtered through the use of fixed effects. Similarly, year dummies control for the effect on local deficits of events that occur across

[25]Spending decentralization is measured as the share of municipal spending in total current spending within a state.

[26]The state budget balance is measured by the state surplus relative to state expenditure.

[27]Contrary to what one might expect, GDP and disposable income per capita are not highly correlated in the sample, such that the joint inclusion of these two variables does not pose multicollinearity concerns.

[28]Cities with county status bear these costs directly. Municipalities without county status share in these costs through their contribution to the county's budget. The local level receives federal assistance for these costs via the state level.

the entire cross-section of municipalities. Most importantly, the state of the economy with its cyclical upturns and downturns is taken into account. The error term $\varepsilon_{i,t}$ is clustered at the county level, allowing the unobservables of municipalities belonging to the same county to be correlated.[29]

A central challenge to be tackled in the empirical analysis is the potential endogeneity of the transfer dependency variable. Transfer dependency can hardly be considered to be exogenous. The amount of transfers a municipality receives is dependent on a myriad of economic and institutional factors, as explained in Section 3.2. One particular concern is potential reverse causality: The amount of transfers awarded may – at least in part – be the result of a bargaining process between communities and state governments, in which local fiscal stances might be an important bargaining parameter. Thus, the assumed flow of causation from transfer dependency might also run the opposite direction, with the level of transfer dependency dependent upon the recipient government's deficit situation, e.g., in case of consolidation assistance transfers. Hence, regression results obtained without addressing endogeneity concerns may be viewed with some legitimate skepticism. One way to counter endogeneity problems is the use of one or several instrumental variables. Such variables are correlated with the (potentially) endogenous variable, i.e. transfer dependency, without themselves belonging into the structural model characterized by Equation 3.5. They allow consistent estimation of β_1 even in the presence of endogeneity. To check whether estimation results may be biased by endogeneity, Equation 3.5 is re-estimated using an instrumental variable approach.

This step, i.e. two-stage least squares estimation, is also necessary to rule out an additional source of potential bias. One may suspect a mechanical link between the local deficit per capita and the transfer dependency measure because the construction of both numbers contains total revenues. If own revenues rise in a given year in a municipality, for example due to higher business tax revenue, while all other factors are held constant, this increase corresponds to a lower deficit and a lower weight of transfers in the revenue mix.[30]

[29]One important reason why errors might be correlated at the county level is that counties exercise regulatory oversight over their municipalities. They may thus become involved in the municipal budget process (see Chapter 4).

[30]Nevertheless, there is no clear mechanical link between the two variables. Transfer dependency as defined in this paper can increase for two reasons. First, it can increase because transfers to the municipality increase. Mechanically, i.e. holding all other factors fixed, one would expect the deficit to decrease following such an increase in transfer dependency. Second, transfer dependency can increase because own revenues decrease. Mechanically, this would lead to a higher deficit. Thus, there is no unambiguous mechanical link between the transfer dependency and the deficit variable.

A positive correlation between transfer dependency and local deficits could be the result of the common pool, soft budget constraint, accountability problems etc. underlying H1 or the reflection of a mere mechanical effect. In the baseline regression, employing fixed effects and year dummies is a first strategy to ensure that the behavioral impact of transfer dependency is correctly identified.[31] Using two-stage least squares is a second and more complete strategy. By replacing the transfer dependency variable with fitted values of the first stage regression, the possibility of a pure mechanical construction effect is eliminated.

Hypothesis H2 and its corresponding sub-hypotheses advance conditional effects of transfer dependency and thus require an interaction term to be introduced into the regression model, as shown in Equation 3.6.

$$deficit_{i,t} = \beta_2 Dep_{T,i,t} + \beta_3 Dep_{T,i,t} \times I_{s,t} + \delta \mathbf{X_{i,t}} + \theta \mathbf{Y_{c,t}} + \lambda \mathbf{Z_{s,t}} + \alpha_i + \Phi_t + \varepsilon_{i,t} \quad (3.6)$$

The variable $I_{s,t}$ takes different forms depending on the sub-hypothesis. For a test of H2.1, total transfer dependency is interacted with borrowing autonomy, as measured by a state-level index of credit access.[32] For H2.2, the interaction is with alternate measures of horizontal fiscal imbalance (standard deviation of population, of disposable income of private households per capita, or of GDP per capita among all municipalities of a state). An election year dummy or state spending decentralization are interacted with transfer dependency to investigate the validity of H2.3 and H2.4, respectively. Finally, a model containing all relevant contingent effects is estimated.

H3 is tested by introducing dependency on shared taxes ($Dep_{ST,i,t}$), dependency on unconditional transfers ($Dep_{UT,i,t}$) and dependency on conditional transfers ($Dep_{CT,i,t}$) separately into the regression model instead of total transfer dependency ($Dep_{T,i,t}$).

$$deficit_{i,t} = \beta_4 Dep_{ST,i,t} + \beta_5 Dep_{UT,i,t} + \beta_6 Dep_{CT,i,t} + \delta \mathbf{X_{i,t}} + \theta \mathbf{Y_{c,t}} + \lambda \mathbf{Z_{s,t}} + \alpha_i + \Phi_t + \varepsilon_{i,t} \quad (3.7)$$

[31] After all, municipal characteristics – for instance, the general level of the municipality's spending and revenue – and time-specific effects such as the state of the economy are partialled out by municipal and time fixed effects.

[32] The credit access index is developed in Chapter 4 of this dissertation.

Given H1, coefficients for each type of transfer dependency should be positive. Following H3, the strongest effect is expected for conditional transfers, followed by unconditional transfers.

Table 3.2 summarizes the expectations on the coefficients of interest given H1 to H3.

Table 3.2: Expected coefficients

Hypothesis	Expectation on coefficient of interest
H1	$\beta_1 > 0$
H2.1-2.4	$\beta_2 > 0$; $\beta_3 > 0$
H3	$\beta_4 > 0$; $\beta_5 > 0$; $\beta_6 > 0$
	$\beta_6 > \beta_5 > \beta_4$

Tables 3.13 and 3.14 in the appendix recap variable definitions and list data sources for the calculation of all variables used in the regression analysis. Summary statistics of the main regression variables are given in Table 3.3.

Table 3.3: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Current budget deficit p.c.	-121.613	313.448	-12546.164	9780.752	72807
Transfer dependency	55.413	11.943	4.455	99.322	73538
Dependency on shared taxes	26.765	8.324	1.879	83.046	73538
Dependency on unconditional transfers	21.312	11.397	-5.864	77.339	73538
Dependency on conditional transfers	7.335	4.753	-3.143	69.108	73538
Credit access index	1.512	1.003	0	5	73538
Standard deviation of GDP p.c.	6.038	2.4	1.1	9.426	69953
Standard deviation of household income p.c.	1.472	0.472	0.292	2.612	69953
Standard deviation of population	33664.507	21646.196	6467.447	196730.641	73538
Election year	0.261	0.439	0	1	73538
Spending decentralization	38.541	2.577	28.733	46.026	51002

Source: Own calculations. For data sources see Table 3.13 in the appendix.

3.5 Results

This section first presents baseline results concerning Hypothesis 1 (Section 3.5.1), which are then verified using an instrumental variable approach (Section 3.5.2) and a robustness check (Section 3.5.3). Finally, the results concerning the econometric analysis of Hypotheses 2 and 3 are presented (Section 3.5.4).

3.5.1 Baseline results

Table 3.4 shows results for three regressions aimed at testing Hypothesis 1. According to this hypothesis, greater reliance on transfers from higher levels of government as opposed to own revenues negatively affects fiscal performance. The dependent variable is the municipal deficit per capita in all cases. All specifications control for municipal and

year fixed effects as well as local population. Regression I is augmented with additional controls in columns II (GDP and disposable household income per capita) and III (GDP per capita, spending decentralization and state surplus/expenditure ratio).[33] Due to the differing set of controls with mixed data availability, the sample size varies from over 70,000 observations in specification I to less than 50,000 observations in specification III.

Transfer dependency is estimated to have a positive and strongly significant effect on local deficits across all specifications. This result is in accordance with Hypothesis 1. The estimated coefficients imply that a 1 percentage point increase in transfer dependency leads to an increase of local deficits (or, equivalently, a decrease of local surpluses) by 12.5 to 15.7 euros per inhabitant, ceteris paribus. Figure 3.3 plots the estimated partial effect based on regression III, holding all other variables at their mean values.

Larger cities appear to have lower deficits per capita, as evidenced by the negative coefficient of the population variable. This negative association is surprising given that bigger cities were hypothesized to face softer budget constraints. All other control coefficient show the expected signs: A greater GDP, higher income of private households or higher surplus at the state level all reduce municipal deficits. In contrast, the deficit is higher the more decentralized spending is in the respective state. The latter effect even surpasses transfer dependency's impact on the local fiscal position. As hypothesized, it is apparently more difficult for municipalities to balance their budgets when they are responsible for executing a wider range of tasks.

[33]Other potential controls listed in Section 3.4 were tested but were not statistically significant or did not significantly alter the regression results. In particular, private household income per capita was not significant in specification III.

Table 3.4: Regression results - Hypothesis 1

	I	II	III
Transfer dependency	12.74***	12.53***	15.73***
	(0.83)	(0.77)	(0.93)
Population	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)
GDP p.c.		-7.78***	-5.59***
		(2.36)	(1.55)
Disposable income of private households p.c.		-26.82***	
		(7.07)	
Spending decentralization			25.24***
			(3.27)
State surplus/expenditure ratio			-5.05***
			(0.97)
Constant	-714.61***	-123.31	-1712.13***
	(45.62)	(129.14)	(150.51)
Observations	72807	69210	48907
R^2	0.13	0.13	0.17
Municipalities	5281	5281	5119

Notes: Fixed effects estimates based on Equation 3.5. Unbalanced panel of 5119 to 5281 municipalities for the period 1998 to 2013 (specification *I*), 1998 to 2012 (specification *II*), or 2001 to 2011 (specification *III*). Dependent variable: current budget deficit per capita (municipal level). Independent variable of interest: transfer dependency (municipal level). All specifications control for municipal and year fixed effects. Specification *I* additionally controls for local population (municipal level). Specification *II* further controls for GDP p.c. (in 1000 EUR) and income of private households p.c. (in 1000 EUR) (county level). Specification *III* does not control for private household income but instead controls for spending decentralization and the state surplus/expenditure ratio (state level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

3.5.2 Exploring endogeneity

Before moving on to test Hypotheses 2.1 to 3, we need to verify whether the results obtained so far might be biased by the potential endogeneity of the transfer dependency variable or a possible mechanical link between local deficits and transfer dependency. For

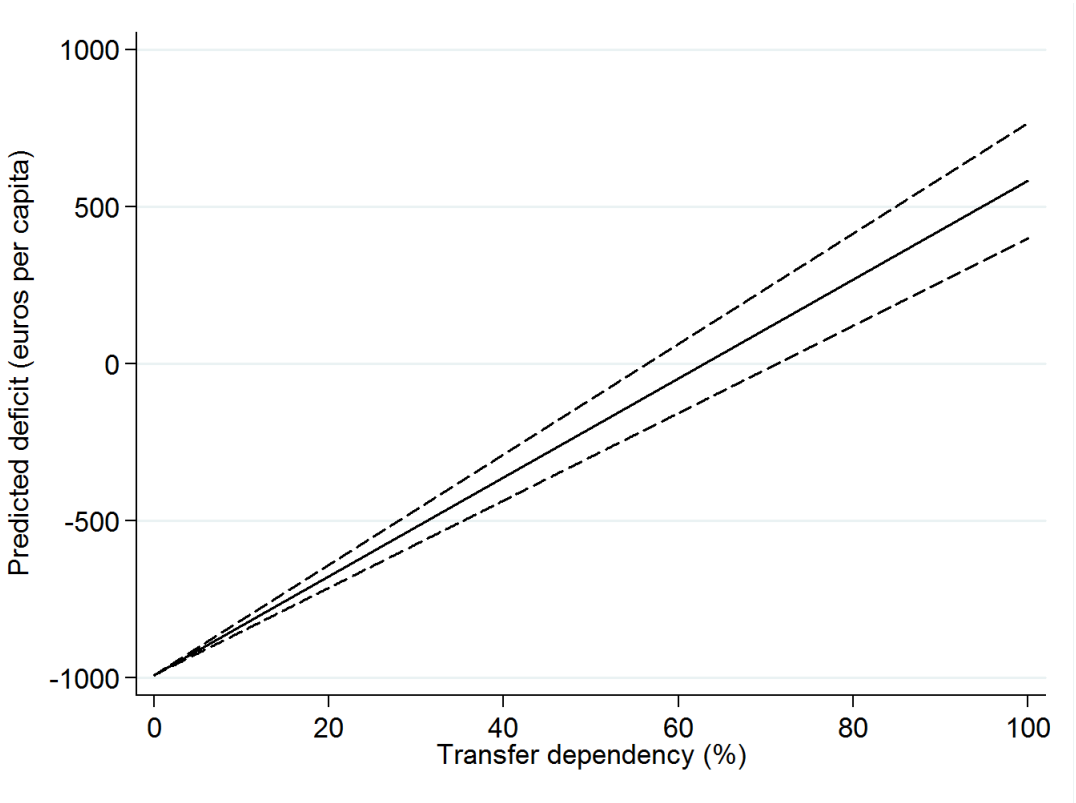

Figure 3.3: Partial effect of transfer dependency

Notes: Partial effect of transfer dependency based on regression *III* in Table 3.4 (solid line). Dashed lines show the 95% confidence interval. All other variables are held at their mean value.
Source: Own calculations. For data sources see Table 3.13 in the appendix.

this purpose, the regression model is re-estimated using an instrumental variable approach. The results are presented in Table 3.5. The number of employees at place of employment per capita, the share of school-age population and the surface area per capita are proposed as instruments for transfer dependency.

In order for these variables to qualify as valid instruments, they should not directly impact local deficits per capita (instrument exogeneity) while being correlated with the endogenous variable, i.e. transfer dependency (instrument relevance). The surface area per capita should have a very limited effect on local budget outcomes. It accounts for differences between rural and city municipalities. A correlation with transfer dependency is suspected because the surface area of municipalities is part of the distribution formulas of equalization transfers in some states and may also influence the composition of local tax revenue. The local share of school-age population could modify the composition of local

spending given that municipalities are responsible for the construction and maintenance of school buildings as well as for local public transport of school children. Nonetheless, a direct impact on the deficit seems unlikely. In contrast, a positive association is expected between the share of school-age population and transfer dependency. A number of federal states include the number of school children in the distribution criteria of equalization transfers and pay out conditional transfers directed at financing school-related activities. The number of employees per capita should also not directly influence local deficits: It is likely to be positively associated with both spending and revenues, but not with the deficit per se. Jurisdictions with a relatively high number of employees per capita are likely to rely more on own revenue sources, in particular business tax and VAT revenues, and less on transfers from higher levels of government.[34] Finding suitable instruments is very challenging in practice, and even the ones proposed here have limitations. Relatively little variation over time is a flaw of all suggested instruments, and it is a particular concern for the municipal surface area, limiting this instrument's explanatory value.[35] In addition, the relationship between the instrument and transfer dependency, as well as potential remaining interdependencies with the deficit, are often less than clear-cut. Take the number of employees per capita: As stated above, it is usually positively related to spending and revenues, and hence not directly related to the deficit. However, counteracting effects on spending also exist, which could create an association between employees and municipal deficits. When employment decreases in a municipality, social welfare spending is bound to increase, albeit with a time lag. The regressions below would not reveal such dynamic effects. Thus, the selected instruments are vulnerable to some legitimate criticism.

Column I of Table 3.5 serves as a plausibility check. It tests whether the proposed instruments should have been included as regular controls into the regression, which would also be an indication of a violation of instrument exogeneity. In a fixed effect regression of local deficits per capita on transfer dependency, the usual controls and the suggested three instruments, all potential instruments are (individually and jointly) statistically insignificant.

Turning to the two-stage least squares regression, column II shows the first-stage regression results. Here, all proposed instruments are statistically significant, making them

[34]Local VAT revenues respond positively to increases in the number of employees as this is one of the main indicators determining the distribution of VAT shares among municipalities, see Section 3.2.1.

[35]Variation in municipal surface areas does exist, but most variation in the surface area *per capita* comes from the fluctuation of the number of inhabitants.

relevant instruments for transfer dependency. The second stage, in column III, reports transfer dependency to be significant at the 10% level with an estimated coefficient of 13.91. This lies within the range of the baseline results presented in Table 3.4. Hence, endogeneity does not appear to be a major concern in the present sample.[36] The remaining hypotheses can thus legitimately be tested by means of the standard fixed effects regression model.

[36]Moreover, the overidentification test (Hansen J statistic) presented in the lower panel of Table 3.5 confirms instrument validity.

Table 3.5: Regression results - Instrumental variable estimation

	FE model	IV model	
		First stage	Second stage
	I	II	III
Dependent variable	deficit p.c.	transfer dependency	deficit p.c.
Transfer dependency	15.79***		13.91*
	(0.92)		(7.22)
Population	-0.01***	-0.00	-0.01***
	(0.00)	(0.00)	(0.00)
GDP p.c.	-5.81***	-0.13***	-5.98***
	(1.58)	(0.05)	(2.01)
Spending decentralization	24.92***	-0.22**	25.19***
	(3.29)	(0.10)	(3.64)
State surplus/expenditure ratio	-4.98***	0.00	-5.19***
	(0.94)	(0.02)	(0.95)
Employees at place of	27.75	-23.00***	
employment p.c.	(163.39)	(2.42)	
Share of school-age population	-0.02	0.00**	
	(0.01)	(0.00)	
Surface area p.c.	1000.52	-136.46*	
	(3756.19)	(75.29)	
Constant	-1696.09***		
	(155.38)		
Observations	48705	48689	48689
R^2	0.17	0.15	0.17
Municipalities	5113	5097	5097
Hansen J statistic	-	-	2.07
(p-value)	-	-	(0.36)

Notes: Fixed effects and two-stage least squares estimates based on Equation 3.5. Unbalanced panel of 5097 to 5113 municipalities for the period 2001 to 2011. Dependent variable in FE model and second stage of IV model: current budget deficit per capita (municipal level). Transfer dependency (municipal level) is treated as exogenous in the FE model. It is the dependent variable in the first stage of the IV model and is instrumented in the second stage with the number of employees at place of employment, the share of school-age population and the surface area p.c. (municipal level). All specifications control for municipal and year fixed effects, local population (municipal level), GDP p.c. (in 1000 EUR, county level), spending decentralization and the state surplus/expenditure ratio (state level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

3.5.3 Robustness

To test the robustness of the results obtained in the previous sections, the actual current deficit per capita is replaced by the primary current deficit per capita as the dependent variable in Equation 3.5. The primary deficit might be a more suitable measure of current fiscal performance as it is not biased by interest payments that are due to past fiscal decisions. Due to limited data availability, using the primary deficit reduces the sample size as well as the underlying time period, which now runs from 1998 to 2006. Corresponding regression results are reported in Table 3.6. The employed controls in columns I to III correspond to those used in Table 3.4. The reported coefficients for transfer dependency are within the range of previous estimates, giving us greater confidence in the validity of all presented regression results.

3.5.4 Additional results

Table 3.7 provides regression results exploring the validity of Hypothesis 2 and its sub-hypotheses, all of which are concerned with potential interactive effects between transfer dependency and other factors.[37] First, column I of the table investigates whether transfer dependency is more detrimental to local fiscal outcomes when municipalities enjoy greater access to borrowing (Hypothesis H2.1). For this purpose, transfer dependency is interacted with a credit access index running from 0 (no credit access) to 6 (complete credit access). The regression supports the hypothesized link: More local borrowing autonomy indeed exacerbates transfer dependency's impact on local deficits.

Columns II to IV address Hypothesis H2.2, namely that transfer dependency affects fiscal outcomes more strongly when horizontal fiscal imbalances are large. This is confirmed by the regressions, which show a positive and significant interaction effect no matter if horizontal fiscal imbalances are measured by the standard deviation of GDP, household income or population of all municipalities within a state. However, the best fit is achieved in regression III, which employs the standard deviation of household income as the chosen indicator of horizontal fiscal imbalance.

Columns V and VI deal with Hypotheses H2.3 and H2.4, respectively. In both cases, the interaction term fails to reach conventional levels of statistical significance.

[37] All regressions in Table 3.7 include the same controls as column III in Table 3.4, i.e. municipal and year fixed effects, population, GDP per capita, spending decentralization and the state surplus/expenditure ratio.

Table 3.6: Regression results - Robustness check using primary deficit

	I	II	III
Transfer dependency	11.98***	11.99***	15.41***
	(0.85)	(0.85)	(1.12)
Population	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)
GDP p.c.		-12.98***	-8.34**
		(2.98)	(3.25)
Disposable income of private households p.c.		-26.05**	
		(12.90)	
Spending decentralization			25.90***
			(3.69)
State surplus/expenditure ratio			-6.90***
			(1.24)
Constant	-688.25***	-26.97	-1552.99***
	(52.63)	(208.65)	(180.95)
Observations	44854	44845	30028
R^2	0.09	0.09	0.13
Municipalities	5273	5272	5110

Notes: Fixed effects estimates based on Equation 3.5, where the current deficit per capita is replaced by the current primary deficit per capita. Unbalanced panel of 5110 to 5273 municipalities for the period 1998 to 2006 (specifications *I* and *II*) or 2001 to 2006 (specification *III*). Dependent variable: current primary budget deficit per capita (municipal level). Independent variable of interest: transfer dependency (municipal level). All specifications control for municipal and year fixed effects. Specification *I* additionally controls for local population (municipal level). Specification *II* further controls for GDP p.c. (in 1000 EUR) and income of private households p.c. (in 1000 EUR) (county level). Specification *III* does not control for private household income but instead controls for spending decentralization and the state surplus/expenditure ratio (state level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

Thus, neither upcoming elections (H2.3) nor spending decentralization (H2.4) appear to alter the way transfer dependency affects the municipal budget balance.

Finally, the last column of Table 3.7 includes all interaction effects that were found to be significant in the previous regressions. Transfer dependency is interacted with both

credit access and horizontal fiscal imbalances (as measured by the standard deviation of household income) to present a unified test of Hypothesis 2. Both terms retain statistically significant coefficients that are almost equal to their previously estimated coefficients (columns I and III). Moreover, transfer dependency itself is still individually significant, as was the case in all previous regressions. Compared to regression III in Table 3.4, the estimated coefficient is markedly lower, indicating that transfer dependency's isolated impact was previously overestimated.

In sum, while no support was found for any contingent effect of elections years or spending decentralization, the impact of transfer dependency does seem to be contingent on local credit access and horizontal fiscal imbalances, as predicted by Hypothesis 2.

Table 3.7: Regression results - Hypothesis 2

	H2.1	H2.2			H2.3	H2.4	H2
	I	II	III	IV	V	VI	VII
Transfer dependency (TD)	15.31*** (1.04)	13.78*** (0.99)	10.92*** (0.91)	14.72*** (0.96)	15.75*** (0.93)	18.79*** (5.81)	10.52*** (0.93)
Population	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
GDP p.c.	-5.58*** (1.54)	-5.94*** (1.53)	-4.28*** (1.52)	-5.40*** (1.53)	-5.59*** (1.55)	-5.61*** (1.56)	-4.27*** (1.51)
Spending decentralization	21.78*** (4.01)	24.40*** (3.22)	32.56*** (3.55)	25.74*** (3.22)	25.18*** (3.27)	29.67*** (8.84)	29.20*** (4.37)
State surplus/ expenditure ratio	-4.41*** (1.17)	-4.42*** (0.86)	-8.01*** (1.15)	-5.48*** (0.96)	-5.10*** (0.96)	-5.04*** (0.96)	-7.39*** (1.37)
TD × credit access	0.26* (0.14)						0.26* (0.14)
TD × SD of GDP		0.31** (0.13)					
TD × SD of household income			3.26*** (0.61)				3.25*** (0.61)
TD × SD of population				0.00*** (0.00)			
TD × election year					-0.04 (0.05)		
TD × spending decentralization						-0.08 (0.15)	
Constant	-1580.83*** (177.77)	-1663.71*** (145.82)	-2004.63*** (170.33)	-1737.77*** (148.91)	-1710.73*** (150.50)	-1881.98*** (349.58)	-1876.91*** (199.81)
Observations	48907	48907	48907	48907	48907	48907	48907
R^2	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Municipalities	5119	5119	5119	5119	5119	5119	5119

Notes: Fixed effects estimates based on Equation 3.6. Unbalanced panel of 5119 municipalities for the period 2001 to 2011. Dependent variable: current budget deficit per capita (municipal level). Independent variable of interest: transfer dependency (municipal level) and its interactions (interaction with credit access index (state level, specification *I* and *VII*), horizontal fiscal imbalances as measured by the standard deviation of GDP p.c. (state level, specification *II*), the standard deviation of private household income p.c. (state level, specification *III* and *VII*) or the standard deviation of population (state level, specification *IV*), an election year dummy (state level, specification *V*) or spending decentralization (state level, specification *VI*). All specifications control for municipal and year fixed effects, population (municipal level), GDP p.c. (in 1000 EUR, county level), spending decentralization and the state surplus/expenditure ratio (state level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

Hypothesis 3 is taken up in Table 3.8.[38] According to H3, transfer dependency's impact on local fiscal performance is not uniform but instead depends on the types of transfer the municipality relies on. Dependency on shared taxes, unconditional transfers and conditional transfers are expected to weigh on fiscal discipline unequally. Given the institutional and incentive structure of these transfer types in Germany, conditional transfers were expected to be most harmful to fiscal performance, followed by unconditional transfers and, finally, shared taxes.

Table 3.8 shows that these expectations are only partially confirmed. While it is true that each type of transfer puts a different strain on local deficits, the order of estimated effects is not in line with theoretical expectations. Shared taxes are estimated to have by far the strongest negative impact, followed by conditional transfers. Dependency on unconditional transfers, on the other hand, does not affect local deficits in a statistically significant manner. This may be due to the institutional design of the majority of unconditional transfers to municipalities in Germany, which preserves incentives for tax effort and is not easily manipulable (see Section 3.3).

These results point to the importance of including shared taxes in any measure of "total" transfer dependency. Neglecting them, as is often done due to data availability issues, could lead to drastically underestimating the negative side effects of lacking revenue autonomy. On the other hand, the results confirm that when it comes to "actual" transfers, unconditional transfers should be preferred over conditional transfers whenever possible.

Why do shared taxes appear to be so detrimental although they should not have substitution effects and although their distribution among municipalities is not subject to state discretion and/or state-municipal bargaining? De Mello (2000) suggests one potential explanation. He argues that the complete lack of state discretion over shared taxes devolved to the municipalities may pose fiscal challenges. It may reduce incentives for efficient management of these funds at the local level and weaken coordination efforts between the state and its municipalities. De Mello (2000) argues that this is particularly true for revenue-sharing formulas of broad-base taxes – which is the case here. Further research should aim to substantiate this explanatory avenue.

[38]The controls employed in columns I to III correspond to those used in the regressions shown in Table 3.4.

Table 3.8: Regression results - Hypothesis 3

	I	II	III
Dependency on shared taxes	32.03***	31.79***	38.38***
	(1.63)	(1.52)	(1.67)
Dependency on unconditional transfers	0.80	0.18	0.63
	(0.53)	(0.52)	(0.58)
Dependency on conditional transfers	8.97***	9.73***	12.59***
	(0.98)	(1.00)	(0.92)
Population	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)
GDP p.c.		-7.30***	-3.93**
		(2.70)	(1.74)
Disposable income of private households p.c.		-42.69***	
		(7.49)	
Spending decentralization			22.90***
			(3.88)
State surplus/expenditure ratio			-12.24***
			(1.01)
Constant	-949.97***	-119.16	-1934.71***
	(55.66)	(137.44)	(169.37)
Observations	72807	69210	48907
R^2	0.22	0.23	0.31
Municipalities	5281	5281	5119

Notes: Fixed effects estimates based on Equation 3.7, where transfer dependency is replaced by its components. Unbalanced panel of 5119 to 5281 municipalities for the period 1998 to 2013 (specification *I*), 1998 to 2012 (specification *II*), or 2001 to 2011 (specification *III*). Dependent variable: current budget deficit per capita (municipal level). Independent variables of interest: dependency on shared taxes, unconditional transfers, or conditional transfers (municipal level). All specifications control for municipal and year fixed effects. Specification *I* additionally controls for local population (municipal level). Specification *II* further controls for GDP p.c. (in 1000 EUR) and income of private households p.c. (in 1000 EUR) (county level). Specification *III* does not control for private household income but instead controls for spending decentralization and the state surplus/expenditure ratio (state level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

3.6 Conclusion

Theoretical considerations lead to the expectation that local governments which rely more heavily on transfers from higher levels of government will tend to produce less favorable fiscal outcomes. This paper is the first to confirm this proposition empirically for a large disaggregated dataset, using the case of municipalities in Germany. The results indicate that transfer dependency lowers the local budget balance and that its effect is aggravated when it coincides with horizontal fiscal imbalances within the federal state in question and/or easy local access to borrowing. A detrimental interactive effect of the occurrence of parliamentary elections or the degree of spending decentralization at the state level, on the other hand, could not be detected.

Moreover, not all transfers are created equal. Thick institutional knowledge of the country in question is required to construct convincing, decomposed transfer dependency measures. Shared taxes, unconditional and conditional transfers each weigh differently on local fiscal performance. Aggregate measures of transfer dependency may therefore be too broad to adequately reflect the channels through which different types of transfers influence budgetary outcomes. For the sample of German municipalities, a statistically significant harmful effect could only be demonstrated for shared taxes and conditional transfers. Unconditional transfers were not found to affect local deficits in either direction. This neutrality of unconditional transfers may be due to the institutional design of the majority of unconditional transfers to local jurisdictions in Germany, which places great emphasis on incentive-compatibility, stringent rules and objective, non-manipulable eligibility criteria. Future research should aim to verify whether this result also holds in other countries where unconditional transfers may not be as well-designed. The strong negative impact of shared taxes underscores the importance of including shared taxes into any aggregate measure of transfer dependency – if an aggregate measure is still deemed appropriate –, which is not always done in current research due to limited data availability.

The findings suggest important policy implications. First, they bolster the oft-stated recommendation to accompany decentralization on the spending side with sufficient decentralization on the revenue side. Sound fiscal performance at the local level requires not only sufficient quantities of local revenue. It also requires the right kinds of local revenue. A substantial share of own revenues in the local revenue mix strengthens local legitimacy over the use of financial resources as well as local accountability, lessens bailout expectations and improves fiscal discipline. Second, to the extent that transfers to lower

levels of government are required and might even need to be increased, attention should be paid to the choice of the transfer instrument. Too much emphasis on shared taxes and conditional transfers to fill local financing gaps might be particularly damaging in view of fiscal sustainability at the local level.

3.7 Appendix

Table 3.9: Federal states in data sample

Federal states	Code	Sample period	Number of observations	Average number of observations per year
Schleswig-Holstein	SH	1998 to 2006	937	104.1
Lower Saxony	LS	1998 to 2011	4038	288.4
North Rhine-Westphalia	NW	1998 to 2008	4356	396
Hesse	HE	1998 to 2013	6813	425.8
Rhineland-Palatinate	RP	1998 to 2011	683	48.8
Baden-Württemberg	BW	1998 to 2013	17691	1105.7
Bavaria	BV	1998 to 2013	32877	2054.8
Saarland	SL	1998 to 2006	468	52
Brandenburg	BB	1998 to 2006	929	103.2
Mecklenburg-Vorpommern	MV	1998 to 2006	512	56.9
Saxony	SX	1998 to 2006	2059	228.8
Saxony-Anhalt	SA	1998 to 2006	278	30.9
Thuringia	TH	1998 to 2013	1926	120.4

Table 3.10: Average of dependency on shared taxes over time

Year	SH	LS	NW	HE	RP	BW	BV	SL	BB	MV	SX	SA	TH	Total
1998	30.8	24.3	25.6	32.4	27.3	28.7	27.6	21.8	12.2	11.0	10.9	9.8	10.0	25.2
1999	29.5	24.9	26.1	32.7	27.4	28.6	28.1	21.7	11.6	11.0	12.3	11.6	11.0	25.6
2000	29.0	24.6	25.3	35.2	28.4	29.0	28.4	23.6	12.0	11.3	11.7	10.0	10.0	25.8
2001	28.2	23.9	24.6	34.9	27.6	29.1	29.6	22.2	11.8	10.3	11.0	10.2	10.5	26.6
2002	27.4	23.8	25.0	34.0	26.8	29.7	29.1	21.9	10.8	9.9	10.1	10.8	10.5	26.2
2003	26.8	23.9	25.8	33.0	27.2	30.0	28.6	22.1	10.1	9.9	10.6	10.6	11.4	25.9
2004	24.4	21.5	22.6	30.8	24.4	27.4	26.6	20.9	10.6	9.3	10.4	11.4	10.9	23.9
2005	22.8	21.6	22.2	30.6	26.1	27.0	26.9	21.2	10.6	9.8	10.4	11.2	11.1	23.8
2006	23.7	23.4	23.2	31.1	25.5	26.5	27.5	20.5	12.1	10.8	12.5	12.1	11.8	24.5
2007	.	24.2	23.5	31.3	27.1	27.3	29.0	.	.	.	.	.	13.2	27.1
2008	.	25.8	24.2	32.1	27.3	28.1	29.6	.	.	.	.	.	15.0	28.0
2009	.	24.6	.	31.4	28.9	28.2	29.7	.	.	.	.	.	14.9	28.3
2010	.	24.4	.	30.2	25.3	27.0	28.0	.	.	.	.	.	11.4	27.5
2011	.	24.2	.	29.7	25.8	26.6	28.7	.	.	.	.	.	11.4	27.6
2012	.	.	.	28.8	.	27.1	29.6	.	.	.	.	.	12.0	28.4
2013	.	.	.	29.9	.	27.8	29.6	.	.	.	.	.	12.3	28.9
Total	27.0	23.9	24.4	31.8	26.8	28.0	28.5	21.8	11.3	10.4	11.1	10.9	11.7	25.9

Source: Own calculations based on data from the FDZ and data provided by the statistical offices of the Länder.

Table 3.11: Average of dependency on unconditional transfers over time

Year	SH	LS	NW	HE	RP	BW	BV	SL	BB	MV	SX	SA	TH	Total
1998	14.3	15.8	18.9	16.1	10.7	17.2	21.0	25.9	36.2	43.7	34.0	38.1	45.8	21.8
1999	14.0	14.5	18.8	17.2	10.5	19.6	21.3	27.3	35.6	42.9	34.5	36.1	45.6	22.5
2000	15.2	15.3	20.2	16.7	10.7	20.6	21.8	28.0	35.0	42.9	35.8	36.3	47.9	23.3
2001	17.1	15.8	20.7	17.8	11.0	19.3	23.7	29.7	35.4	42.7	36.2	35.6	44.9	22.9
2002	16.8	15.0	20.7	18.2	11.4	19.2	24.4	29.6	35.9	43.2	36.3	34.5	45.1	23.2
2003	16.3	13.1	16.6	17.5	11.3	17.1	24.1	28.1	38.2	42.5	35.5	31.7	44.8	22.2
2004	15.0	13.3	19.9	15.6	10.6	16.8	23.1	26.4	33.8	39.8	33.7	29.7	44.4	21.7
2005	16.2	13.0	16.5	15.9	10.5	16.0	22.5	27.2	35.7	36.0	31.7	29.4	42.4	20.7
2006	14.0	13.2	15.6	16.3	10.0	18.6	21.8	28.1	36.4	32.5	27.8	30.3	39.5	20.7
2007	.	16.2	17.0	18.5	9.8	19.6	21.0	.	.	.	.	.	37.8	19.9
2008	.	14.6	18.4	18.1	9.5	20.6	21.0	.	.	.	.	.	35.8	20.1
2009	.	17.3	.	19.2	10.4	20.9	21.7	.	.	.	.	.	39.2	21.2
2010	.	14.5	.	16.2	10.9	21.5	21.1	.	.	.	.	.	33.9	19.6
2011	.	16.0	.	17.4	10.6	21.3	19.8	.	.	.	.	.	32.6	19.3
2012	.	.	.	18.9	.	19.7	19.7	.	.	.	.	.	29.2	19.6
2013	.	.	.	19.0	.	20.3	20.8	.	.	.	.	.	34.5	20.3
Total	15.4	14.8	18.5	17.4	10.6	19.3	21.8	27.8	35.8	40.7	34.0	33.5	40.2	21.6

Source: Own calculations based on data from the FDZ and data provided by the statistical offices of the Länder.

Table 3.12: Average of dependency on conditional transfers over time

Year	SH	LS	NW	HE	RP	BW	BV	SL	BB	MV	SX	SA	TH	Total
1998	7.1	15.3	6.1	3.3	14.1	7.0	5.3	14.4	18.7	9.9	16.0	18.8	14.4	8.1
1999	7.3	14.7	6.0	3.4	13.2	7.0	5.3	13.2	18.4	9.4	15.6	17.8	13.3	8.0
2000	7.2	14.5	6.0	3.3	14.1	7.0	5.2	11.7	17.1	9.3	15.1	16.6	12.1	7.7
2001	7.4	14.2	5.9	3.3	13.6	7.6	5.4	11.6	19.5	8.7	14.3	16.6	10.3	7.7
2002	7.3	13.8	6.0	3.4	13.5	8.0	5.3	11.1	19.5	8.8	16.9	18.1	9.6	7.9
2003	7.9	14.1	6.0	3.6	14.3	8.1	5.2	10.8	19.9	8.4	15.7	18.0	8.7	8.0
2004	7.8	13.3	5.5	3.6	14.3	9.2	4.7	11.3	17.4	8.5	13.7	16.9	7.6	7.8
2005	7.8	11.4	6.9	3.8	12.6	9.0	4.4	7.7	12.7	8.8	13.3	13.7	5.4	7.3
2006	7.5	9.1	6.1	3.4	12.1	8.1	5.1	6.2	12.3	8.7	14.0	13.1	7.7	7.1
2007	.	7.6	5.6	3.9	11.9	7.2	6.4	.	.	.	.	.	8.4	6.5
2008	.	8.0	6.3	4.0	11.1	6.9	6.6	.	.	.	.	.	8.3	6.6
2009	.	8.6	.	4.6	13.7	8.1	7.3	.	.	.	.	.	8.8	7.5
2010	.	8.9	.	4.9	14.0	8.1	7.5	.	.	.	.	.	21.3	7.6
2011	.	8.2	.	6.1	13.9	8.3	7.6	.	.	.	.	.	20.9	7.8
2012	.	.	.	4.5	.	9.4	7.9	.	.	.	.	.	21.8	7.9
2013	.	.	.	5.3	.	9.4	8.6	.	.	.	.	.	15.3	8.3
Total	7.5	11.5	6.0	4.0	13.3	8.0	6.1	10.9	17.3	9.0	15.0	16.6	12.1	7.6

Source: Own calculations based on data from the FDZ and data provided by the statistical offices of the Länder.

Table 3.13: Variable definitions and data sources, main variables

Variable	Definition	Data Source
deficit	current spending minus current revenues (in EUR), relative to population	Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder, Regional Database Germany
primary deficit	current spending (excluding interest payments) minus current revenues (in EUR), relative to population	Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder
transfer dependency	share of shared taxes, unconditional and conditional transfers in gross current revenue	Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder, Regional Database Germany
dependency on shared taxes	share of shared taxes in gross current revenue	Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder, Regional Database Germany
dependency on unconditional transfers	share of unconditional transfers in gross current revenue	Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder, Regional Database Germany
dependency on conditional transfers	share of conditional transfers in gross current revenue	Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder, Regional Database Germany
borrowing autonomy	state-level index of credit access	Chapter 4 of this dissertation
horizontal fiscal imbalance	standard deviation of population, disposable income of private households per capita, or of GDP per capita among all municipalities of a state	Regional Database Germany, Statistik lokal
election year	dummy for election years of state parliamentary elections	Regional Database Germany, Statistik lokal
spending decentralization	share of municipal spending in total current spending within a state (in percent)	Federal Statistical Office, FS 14 R 3.1

Table 3.14: Variable definitions and data sources, control variables

Variable	Definition	Data Source
	Municipal-level controls	
population	registered local inhabitants	Regional Database Germany, Statistik lokal
dependency ratio	share of under 18- and over 65-year-olds in the total population	Regional Database Germany, Statistik lokal
school-age population	share of under 18-year-olds in the total population	Regional Database Germany, Statistik lokal
employees at place of employment	number of employees at place of employment per capita	Federal Employment Agency (BA)
employees at place of residence	number of employees at place of residence per capita	Federal Employment Agency (BA)
in-commuters	number of in-commuters per capita	Federal Employment Agency (BA)
surface area	surface area per capita	Regional Database Germany, Statistik lokal
density	population relative to surface area	Regional Database Germany, Statistik lokal
	County-level controls	
GDP	GDP per capita	Regional Database Germany, Statistik lokal
social welfare households	number of households eligible for social welfare benefits per capita	Federal Employment Agency (BA)
left majority	dummy for a left majority at the latest state parliamentary elections	Regional Database Germany, Statistik lokal
	State-level controls	
state budget balance	state surplus/deficit relative to state expenditure	Federal Statistical Office, FS 14 R 3.1

Chapter 4

Tax smoothing and credit access

Abstract

Are local tax rates less volatile if municipalities have easier access to credits? Do local governments smooth tax rates if they are granted access to borrowing? Economic theory shows that public debt can be useful to enhance social welfare if it enables governments to smooth taxes over time. This paper investigates the empirical relationship between credit access and tax smoothing using the case of German municipalities. If local tax rates are less volatile in federal states granting easier access to borrowing, there is some benefit to allowing public debt and a trade-off between tax smoothing and budget discipline arises. If not, local credit rationing is advisable. We carry out an in-depth institutional analysis of local credit access in Germany, which yields an original credit access index. We refute a positive association between credit access and tax smoothing for the case of German municipalities based on four steps of empirical, i.e. descriptive and econometric, analysis. The entire analysis is based on a dataset of over 10,000 municipalities in all German territorial states.

4.1 Introduction

In the context of recent debt crises, political practitioners emphasize risks associated with high public debt levels and try to design effective measures for limiting debt build-up. Public debate often portrays debt as something that is best avoided or at least strictly limited. Otherwise, countries might one day have to suffer the consequences in the form of debt crises, recessions, fiscal austerity and painful reforms to clean up the mess.[1]

[1]The controversy on the risks associated with high debt levels was fueled by the research of Reinhart and Rogoff (2010), which posits a link between rising debt levels and weak economic growth and its critical replication by Herndon et al. (2014).

On the other hand, economic theory suggests that public debt can be a useful tool to maximize social welfare. In his seminal contribution, Barro (1979) puts forward his theory of tax smoothing. From a welfare perspective, deadweight losses and hence tax rates should be smoothed over time in order to minimize distortionary costs from taxation. Credit rationing could inhibit tax smoothing. Though the ability to run budget deficits and access debt is not a necessary condition for tax smoothing, it greatly improves chances of tax smoothing in practice. However, the proliferation of public debt and political efforts for restraining debt demonstrate that it is not used solely for this laudable purpose.[2] Rules on debt and budget deficits may therefore be warranted.

The question whether debt access should be limited is not only relevant at the national level. In federal states where subnational levels of governments enjoy tax autonomy, higher-level governments set the legal framework which determines budget and debt rules for lower levels. As this paper argues, governments may face a trade-off between enforcing budget discipline and easing tax smoothing when designing these rules. According to the standard recommendation of the fiscal federalism literature, lower levels of government should not be granted access to debt, at least not for financing current deficits (e.g., Oates 2005). However, ruling out debt finance could prevent subnational governments that enjoy tax autonomy over certain taxes from engaging in welfare-enhancing tax smoothing.

This paper investigates the empirical relationship between credit access and tax smoothing using the case of municipalities in Germany. Two distinguishing characteristics make German municipalities particularly suitable for the analysis: First, all municipalities in Germany enjoy autonomy over the business tax and the property tax, with the former being highly volatile. Their (in)ability to smooth these tax rates over time is thus a salient issue. Second, in the last two decades some German federal states have eased their municipalities' access to credits, while other states still strictly enforce credit rationing of municipalities for current expenditures. Given local tax autonomy and the variation in local credit rationing amongst German federal states, this paper asks: Are local tax rates less volatile in federal states where municipalities have easy access to credits? If the answer is affirmative, there is some benefit to allowing public debt and the aforementioned trade-off between tax smoothing and budget discipline arises. If the answer is negative, the potential benefits of credit access do not materialize in practice and local credit rationing is advisable.

[2]Further purposes of debt established by economic theory are counter-cyclical fiscal policy or intergenerational equity.

We contribute to the literature, first, by developing and using an innovative and intuitive approach to investigating the strength of tax smoothing behavior. In contrast to existing studies, we do not ask whether governments do or do not engage in tax smoothing. Instead, we analyze whether tax rates become smoother and thus closer to Barro's ideal if the institutional setting becomes more accommodating. We focus on smoothing taxes over the business cycle, factoring out the structural, long-term tax smoothing component. The sizable empirical and theoretical literature on tax smoothing following the pioneering work of Barro (1979) and Bohn (1990) typically defines tax smoothing as constant tax rates in the case of perfect foresight. In case of imperfect foresight tax rates are changed whenever new information about the expected permanent expenditure path arises.[3] On this basis we define "smoother tax rates" as tax rates that are subject to a smaller number of changes within a given time period. This measure constitutes an intuitive and straightforward translation of theoretical tax smoothing definitions found in the literature into the context of local tax policy. Our approach also allows us to use tax rate data and investigate tax rate volatility directly. This is in contrast to the indirect tax smoothing tests prevalent in existing literature, which rely on the behavior of the budget balance or government expenditure over time.[4]

Second, we establish a link between tax smoothing and actual credit access that is to the best of our knowledge almost entirely missing from the literature to date. While credit access is typically not an issue at the national level, it becomes crucial once we move to subnational levels of government.[5] The empirical analysis yields an original index of local credit access based on the differing institutional, legal and administrative environment in each state. This index allows us to investigate the relationship between credit access and the strength of tax smoothing at the local level based on a dataset of

[3]See, e.g., Adler (2006), Bohn (1990), Ghosh (1995) and Strazicich (1997).

[4]Indirect tests of tax smoothing typically rely on a theoretical model which derives a clear relationship between tax rates and the budget surplus. They use the theoretical model to predict how the budget surplus should evolve if the government engages in tax smoothing. There is an array of different econometric tests (depending on the particular question, the available data and model) to examine if the development of the budget surplus found in the actual data is in line with the predicted path of the model. Depending on the degree of divergence tax smoothing is confirmed or rejected. See, e.g., Adler (2006), Barro (1979, 1995), Bohn (1990), Olekalns (1997) and Strazicich (1997).

[5]Most existing studies focus on tax smoothing at the national level, where free credit access can be assumed. Notable exceptions are Strazicich (1997) and Reitschuler (2010). Strazicich (1997) investigates tax smoothing at the subnational level with data from the United States and Canadian provinces, pointing out that results differ by federal level. Reitschuler (2010) introduces the notion that fiscal rules such as those of the European Union, which limit debt access, may inhibit tax smoothing.

over 10,000 municipalities in all German territorial states. In our empirical analysis we find no evidence in favor of a tax smoothing effect of credit access.

Third, we show that a rising number of German municipalities is making abusive use of easier credit access and carries a high burden of short-term debt. So-called liquidity credits that are meant to fill temporary liquidity gaps are increasingly used to cover persistent budget deficits over a medium- to long-term horizon. Our results suggest that granting credit access is an (un)successful attempt of the respective federal states to compensate for revenues that are insufficient to cover rising spending needs and to limit upward pressure on tax rates. Credit access triggers unsustainable behavior, making calls for bailouts more likely. Our paper provides support for the notion that strict credit rationing of the local level may be the best institutional choice for higher-level governments even if there is substantial tax autonomy at the local level.

Section 4.2 starts by explaining the institutional setting. Section 4.2.1 portrays the rules governing local borrowing in the territorial states and provides information on local tax autonomy. Section 4.2.2 details the construction of an original index of local credit access and proposes a measure for tax rate volatility. In Section 4.3 we provide evidence against a contribution of credit access to tax smoothing; we present it in four steps. The first three steps in Section 4.3.1 are based on a descriptive analysis. This is complemented by a fourth, econometric step in Section 4.3.2. Section 4.4 summarizes the findings and concludes.

4.2 Local credit access and tax autonomy

In the first part of this section we provide information on the institutional background. We outline the rules governing local borrowing in the territorial states before turning to local tax autonomy. In the second part of this section, we present our index of credit access and introduce our measure of tax rate volatility.

4.2.1 Institutional background

Local credit access. Federal states grant municipalities varying access to debt. The legal framework for local government finances is defined by local government laws (*Gemeindeordnungen*) and associated regulation in each state. In the following, we analyze legal

provisions and their evolution in each of the 13 territorial states. The three city-states, in which a separate municipal level does not exist, are excluded.

When talking about local public debt in Germany, debt for consumption and investment purposes needs to be distinguished. As per state law in all states and contrary to the state and federal level, municipalities may only go into debt to finance investment, investment assistance, or to restructure existing debt. Formally, debt for consumption purposes is ruled out. Accordingly, local government laws in all states stipulate that municipalities ought to balance their budget each year.

However, liquidity gaps that may arise throughout the budget year even when revenues do not fall short of expenditures make (short-term) credits for consumption purposes a necessity. Unlike financing credits, which are used to fund investment, such liquidity credits (*Liquiditätskredite* or *Kassenkredite*) are not part of local revenues in a legal sense. They are meant to ensure the timely settlement of liabilities and to fill short-term liquidity gaps until "real" revenues become available.[6]

In principle, municipalities cannot plan a budget deficit. This would seemingly violate the balanced budget rules that are enshrined in all local government laws. At first sight, it thus seems that there is barely any scope for tax smoothing at the local level. In practice, however, (planned) budget deficits are commonplace.

Why is that so? First, the balanced budget rules of some states give municipalities some leeway by allowing the use of reserves to finance temporary deficits. Second, the regulatory authority in question may reject unlawful budgets, but it is not obliged to intervene.[7] Regulatory authorities may tacitly approve deficits. Third, even if the budget is rejected, the deficit does not necessarily disappear. Instead, municipalities without a valid budget operate under the rules of provisional budget management, which allow them to carry out their most important tasks and, among other things, levy taxes at previous rates. Changes to tax rates are typically prohibited.

In addition, budgets containing a deficit can be made legal under certain circumstances. A number of states require municipalities that do not achieve budgetary equilibrium to submit a budget consolidation plan, which specifies how the municipality will return to budget balance in the coming years. In most cases, this plan requires approval

[6]Given that liquidity credits are not classified as revenues, they cannot be used to balance the budget.

[7]In case of cities with county status and some big non-associated cities, the state interior ministry is usually the competent regulatory authority. In some states, lower public authorities fulfill this role. For municipalities belonging to a county, regulatory control is exercised by the county.

by the regulatory authority. If approval is denied, the municipality once again finds itself under provisional budget management. Although they were intended as an instrument for enhancing fiscal sustainability, budget consolidation plans also provide a legal avenue for running deficits without the restrictions of provisional budget management. What was once devised as an arrangement for fiscal emergency situations has become widespread. Estimates claim that about a third of all municipalities in Germany was operating either under a budget consolidation plan or provisional budget management as of 2010 (Spars et al. 2010).

All local government laws contain a paragraph specifically on the purpose of and the rules relating to liquidity credits. The wording of these paragraphs gives a first indication of the degree of local credit rationing in the respective state. Table 4.9 in the appendix to this chapter provides an overview of the current wording of these paragraphs in each of the federal states. All provisions emphasize that liquidity credits serve the timely settlement of expenses and the prevention of late payments. This purpose implies their temporary nature. Another common theme is the subsidiarity of liquidity credits: They may only be used if no other funds are available. Moreover, all local government laws require the municipality to define a ceiling up to which liquidity credits may be taken in a given budget year.[8] In all states except Brandenburg, this ceiling must be set in the budget by-law. The budget by-law typically has to be submitted to the competent regulatory authority, which checks its lawfulness. In addition, some states specify that liquidity credit ceilings have to be approved by the regulatory authority if they exceed a threshold (Baden-Württemberg, Hesse, Lower Saxony, Mecklenburg-Vorpommern, Saxony, Saxony-Anhalt, Thuringia), which is defined relative to the municipalities' expenses or revenues. Bavaria goes one step further by ruling out credit ceilings above a threshold level.

A higher degree of local credit rationing can be assumed in states where approval clauses for liquidity credit ceilings (or fixed ceilings) exist. In these states, regulatory authorities are required by law to formally approve or reject problematic credit ceilings. A priori, this suggests stricter oversight. It also gives regulatory authorities an additional lever to limit municipal budget deficits, apart from rejecting budgets or, where applicable, budget consolidation plans.

State regulations regarding liquidity credit ceilings have evolved over time. In fact, all local government laws included an approval clause of credit ceilings at one time or

[8]This ceiling continues to hold under provisional budget management.

another. Table 4.1 lists the most recent approval clauses that once were or still are in effect in state laws.[9] The time of abolishment of approval clauses varies greatly across states. North Rhine-Westphalia and Rhineland-Palatinate were the first to abolish such clauses in 1994. Brandenburg enacted the most recent abolishment in 2008. Interestingly, there seems to be a trend reversal given that two states, Hesse and Saxony-Anhalt, have reintroduced approval clauses in recent years. This may have been in response to soaring levels of short-term local debt.

Table 4.1: Abolishment and introduction of approval clauses

Federal states	Approval clause abolished on	Wording of current or abolished approval clause
Baden-Württemberg	–	§ 89 (3) GemO The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one fifth of the profit and loss budget's ordinary expenses.
Bavaria	01.09.1997	Art. 73 (2) GO The liquidity credit ceiling set in the budget by-law requires approval if 1. the ceiling for the core budget exceeds one sixth of the administrative budget's revenues, 2. the ceiling for owner-operated municipal enterprises exceeds one sixth of the profit plan's revenues.
Brandenburg	01.01.2008	§ 87 (2) GO The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one sixth of the administrative budget's revenues.
Hesse	01.01.1999	§ 105 (2) HGO The ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one fifth of the administrative budget's revenues.
Lower Saxony	–	§ 122 (2) NKomVG The ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one sixth of the cash-flow budget's revenues for current administrative activities.
Mecklenburg-Vorpommern	–	§ 53 (3) KV M-V The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds ten percent of the cash-flow budget's current revenues for administrative activites.
North Rhine-Westphalia	17.10.1994	§ 74 (2) GO NRW The ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one sixth of the administrative budget's revenues.

[9]Where current local government laws still contain approval clauses, the state listing corresponds to Table 4.9 in the appendix.

Federal states	Approval clause abolished on	Wording of current or abolished approval clause
Rhineland-Palatinate	12.06.1994	§ 105 (2) GemO The ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one sixth of the administrative budget's revenues.
Saarland	01.01.2007	§ 94 (2) KSVG The ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one sixth of the administrative budget's revenues.
Saxony	–	§ 84 (3) SächsGemO The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one fifth of the profit and loss budget's ordinary expenses.
Saxony-Anhalt	31.08.2003	§ 91 (2) GO LSA The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one fifth of the administrative budget's revenues.
Schleswig-Holstein	31.03.2006	§ 87 (2) GO The ceiling set in the budget by-law requires approval by the regulatory authority.
Thuringia	–	§ 65 (2) ThürKO The ceiling set in the budget by-law requires approval if 1. the ceiling for the core budget exceeds one sixth of the administrative budget's revenues, 2. the ceiling for owner-operated municipal enterprises or municipal institutions exceeds one sixth of the profit plan's revenues.
	Approval clause reintroduced on	Wording of reintroduced approval clause
Hesse	24.12.2011	§ 105 (2) HGO The ceiling set in the budget by-law requires approval by the regulatory authority.
Saxony-Anhalt	01.07.2014	§ 110 (2) KVG LSA The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one fifth of the cash budget's revenues for current administrative activities.

Source: Local government laws. Translation by authors.

Yet, the effective degree of credit rationing does not only depend on the letter of the law, but also on its enforcement by regulatory authorities. For instance, approval clauses would not make a difference if all credit ceilings were approved indiscriminately. The administrative and political culture in each federal state may have an impact on how rules are interpreted when legal terms leave scope for discretion. For example, the requirement of a balanced budget and the stated purpose of liquidity credits imply that maturities

should normally not exceed one fiscal year. However, local and state policy makers have started to argue that the law does not stipulate rules on permissible maturities for liquidity credits. On these grounds, credit periods of several years have been declared acceptable. The political weight, personal beliefs and competence of individual decision-makers both in municipalities and regulatory authorities may also influence enforcement. In addition, the equipment and staffing of regulatory authorities may be pivotal both in their capacity to detect rule breaches and in their decision to intervene or to refrain from intervention when they do. Capacities may soon be exhausted when a large share of municipalities within the authority's jurisdiction is struggling with fiscal weakness and mounting liquidity credit stocks.

In order to grasp differences in law enforcement and interpretation across states, Table 4.10 in the appendix to this chapter provides information on relevant state circular decrees, ordinances and other official statements regarding the treatment of municipal liquidity credits and budget deficits. Through decrees and ordinances, state governments give instructions that are binding for regulatory authorities (Heinemann et al. 2009). Other official statements also shed light on the prevalent interpretation of legal rules.

A couple of findings emerge from Table 4.10. First, strictness of state enforcement and interpretation of their – very similar – legal rules relating to balanced budgets and liquidity credits differ markedly. While many states show a trend towards a loosening of rules by lengthening acceptable maturities or allowing larger permanent stocks of liquidity credits, others maintain a stricter reading of the law. Moreover, the instructions given to regulatory authorities once again illustrate that a breach of the balanced budget rule often becomes acceptable once municipalities submit a budget consolidation plan. The circular decrees also highlight that there is a link between such budget consolidation plans and local tax policy, as regulatory authorities are urged to ensure that tax rates are sufficiently high in the municipalities in question. Provisional budget management, much like budget consolidation plans, has become widespread and has triggered increasingly lax responses by the authorities.

Thus, even if liquidity credits are not intended to be a tax smoothing tool, local governments may use them as such: Municipalities located in states where they can access liquidity credits to fill budget deficits may delay or even altogether avoid adjustments to their business and property tax rates. The question remains whether they make use of this theoretical possibility in practice.

Local tax autonomy. Municipalities in Germany draw revenues from a variety of sources such as taxes, transfers from the state level, and duties and charges. Among the taxes, two stand out: The business tax (*Gewerbesteuer*) and the property tax (*Grundsteuer*)[10] not only make up a significant share of local revenue, but in contrast to most other taxes their tax rates are set autonomously by municipalities. Every year, each of the more than 11,000 municipalities in Germany sets its own tax multipliers. In 2013, gross business tax revenue in Germany summed up to 43 billion (bn) euros while property tax revenue stood at nearly 12 bn euros. Net revenue from business and property taxes accounted for 15.8% and 5.8% of aggregate municipal income, respectively.

German municipalities do not enjoy full autonomy over business taxation. The federal government uniformly defines the tax base as well as a basic tax rate (*Steuermesszahl*)[11] for the entire country. The actual business tax rate, which is levied on firm profits, is determined by multiplying the basic federal rate with a multiplier (*Hebesatz*) set by each municipality. Municipalities are free in their choice of a multiplier, as long as it does not fall below 200%.[12]

As in the case of business taxation, the property tax base and a basic tax rate are set at the federal level. The tax base is constituted by the so-called uniform values (*Einheitswerte*) of the property, which are meant to reflect the property's value as of a reference date (not its current market value) and which are fixed by federal tax authorities according to standardized procedures. Municipalities in turn fix the multiplier that produces the final tax rate in conjunction with the basic federal rate.[13] The latter is not uniform. It depends on the type of property to be taxed and its location (East versus West Germany).[14] For simplicity, we will refer to local business tax multipliers and local property tax multipliers as business tax rates and property tax rates in the remainder of this paper.

Business and property tax rates have to be set in the budget by-law at the beginning of each year. The budget by-law and hence applicable tax rates may be amended until

[10]When referring to the property tax, we mean the *Grundsteuer B*, which is one of two types of property taxes in Germany. The other, called *Grundsteuer A*, which is also levied by municipalities, only accounts for roughly 3% of total property tax revenue.

[11]The basic federal tax rate is currently set at 3.5%.

[12]This floor was introduced in 2004 in order to restrain detrimental tax competition. However, only a very small number of communities had multipliers below the threshold prior to the reform.

[13]There are no restrictions on admissible property tax multipliers.

[14]It currently varies between 2.6‰ and 10‰.

the end of the budgetary year. However, tax rates changes within the budgetary year are rare in practice.

4.2.2 Measuring credit access and tax rate volatility

An index of credit access. In order to assess the impact of local credit access on the volatility of local tax rates, the information on institutional features discussed in Section 4.2.1 needs to be condensed into an index of credit rationing and credit access. The index presented in this paper reflects the qualitative and quantitative analysis of credit access in all states. The index takes into account observable institutional characteristics that have an influence on local credit access, as discussed in Section 4.2.1. We also aim to capture unobservable institutional characteristics relating to the enforcement of legal rules by regulatory authorities. To do so we use quantitative information on aggregate local liquidity credit stocks as a proxy. The resulting index will be the primary variable of interest in the descriptive and econometric analysis presented in Section 4.3.

More precisely, the qualitative part of the index accounts for institutional characteristics that were found to ease or limit credit access for municipalities. Three of the included characteristics relate to the existence and design of approval clauses for liquidity credit ceilings. The fourth takes into account circular decrees or ordinances which expand local credit access by extending permissible maturities or allowing larger permanent stocks of liquidity credits, amongst others. Yet, as discussed in Section 4.2.1, the effective degree of credit rationing does not only depend on the letter of the law, but also on the way in which regulatory authorities choose to act when it comes to approving credit ceilings or responding to rule breaches. Circular decrees can shed some light on the practice of regulatory authorities, but a lot remains unobservable. In part, such unobservable parameters may be captured by quantitative information on aggregate local liquidity credit stocks, which is thus used to complement the qualitative side of the index. By using data on aggregate local liquidity credit stocks, we assess the effective strength and credibility of the rules. Data on liquidity credits were obtained from North Rhine-Westphalia's statistical office. It is a panel dataset covering all German municipalities from 1998 to 2013.[15]

[15]The percentiles employed in the construction of the credit access index are calculated using the full, unbalanced panel of all municipalities.

Index scores are assigned as follows. We begin by considering the qualitative information gathered in Section 4.2.1. We translate it into index points running from zero to three:

- 0 points if the local government law contains an unconditional approval clause or an upper limit for liquidity credit ceilings,
- + 1 point if the local government law contains a conditional approval clause for liquidity credit ceilings,
- + 2 points if the local government law contains no approval clause for liquidity credit ceilings.
- + up to 1 point if circular decrees are in force which expand credit access beyond what is suggested by the letter of the law.

The index scores reflect the central role of approval clauses for liquidity credit ceilings. As discussed in Section 4.2.1, stricter credit rationing can be assumed when approval clauses exist. Unconditional approval clauses or an upper limit for liquidity credit ceilings represent the strictest institutional choice. The assignment of index scores for circular decrees is less clear-cut. Whether 0, .5 or 1 point was given depends on the exact wording of circular decrees and the amount of leeway given to municipalities. The case of North Rhine-Westphalia may serve as an example. The first known directive dates from 2003. It specified reporting requirements for municipalities with approved budget consolidation plans. Additional reporting was not considered to ease credit access. Hence, 0 points were given for circular decrees for North Rhine-Westphalia's 2003 index. In 2004, a directive stated for the first time that municipalities may have *permanent* stocks of liquidity credits, up to a ceiling. This shift in the administration's treatment of liquidity credits is worth .5 index points. Yet another level of credit access was reached in 2006: A circular decree allowed liquidity credit maturities of up to 5 years, which clearly contradicts the initial purpose of liquidity credits as temporary income fillers. Hence, 1 point is given from 2006 onwards. All considered circular decrees and index points are documented in the appendix.

Quantitative information on yearly liquidity credit stocks in all municipalities of a state is used as a proxy for severity of enforcement with corresponding index points from zero to three:

- + 0 points if the aggregate stock of municipal liquidity credits per person is below the 15th percentile (14.8 euros per person) of all territorial states,
- + 1 point if the aggregate stock of municipal liquidity credits per person is above the 15th percentile and below the 85th percentile (544 euros per person) of all territorial states,
- + 2 points if the aggregate stock of municipal liquidity credits per person is above the 85th percentile of all territorial states,
- + 1 point if more than one third of municipalities in the respective federal state have a liquidity credit stock of more than 544 euros per person.

Rules relating to the existence and approval of budget consolidation plans do not flow into the index as their impact on credit access is ambiguous (see Section 4.2.1). It would be desirable to also include a criterion relating to the percentage of municipalities with liquidity credit stocks of more than a certain percentage of their annual administrative revenues. However, we refrained from doing so due to data availability issues (see Section 4.3.2).

The index suffers from some caveats. In particular, some of the points can be assigned objectively, while others require the authors' individual assessment and interpretation.[16] The latter is particularly true for the translation of circular decrees into index scores. Moreover, the thresholds involved in the construction of the quantitative part of the index are somewhat arbitrary, as is the weighting of the criteria. However, these caveats are common when it comes to index constructions, see, e.g., Ciagala and Heinemann (2012).[17]

According to the above set of rules, the index of local credit access is calculated for each federal state for each year between 1998 and 2013. It runs from 0 (no credit access/complete credit rationing) to 6 (complete credit access/no credit rationing). Table 4.2 lists the resulting index values. Table 4.14 in the appendix details the points given for each characteristic in each year.

[16]In an effort to improve our judgment, we consulted with a number of experts on local public finance in Germany to ensure we have a deep understanding of the evolution of local debt rules in Germany.

[17]There are more advanced index construction procedures such as, for instance, indexes based on the principal component analysis (see, e.g., International Monetary Fund 2009). However, they are beyond the scope of this research.

Table 4.2: Development of credit access index, 1998-2013

Federal states	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Baden-Württemberg	1	1	1	1	1	1	1	2	1	1	1	1	2	2	1	1
Bavaria	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
Brandenburg	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.5	3.5	3.5	3.5	3.5	3.5
Hesse	2	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3
Lower Saxony	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
Mecklenburg-Vorpommern	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
North Rhine-Westphalia	3	3	3	3	3	3	3.5	4.5	5	5	5	5	6	6	6	6
Rhineland-Palatinate	3	3	3	3	3	3	3	3	3	4	5	5	5	5	5	5
Saarland	2	2	2	3	4	4	4	4	4	5	4	5	5	5	5	5
Saxony	2	2	1	1	2	2	2	2	2	2	1	1	1	1	1	1
Saxony-Anhalt	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
Schleswig-Holstein	0	0	0	1	1	1	1	1	2	4	4	4	4	4	4	4
Thuringia	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Notes: Index based on institutional characteristics that ease or limit credit access for municipalities and on quantitative information on local liquidity credit stocks, developed by authors. See Table 4.14 in the appendix for more detailed information on the assignment of index scores.

A measure of tax rate volatility. We propose the number of tax rate changes per municipality within a given time period as a measure of tax rate volatility. The number of tax rate changes gives equal importance to each tax rate adjustment regardless of its magnitude or its direction.[18] A smaller number of changes would seem more in line with tax smoothing, ceteris paribus. Steady tax rates reduce the distortionary costs of taxation. Changes to tax rates not only raise distortionary costs but also induce further costs, e.g.,

[18]We consider the number of tax rate changes to be the most natural and intuitive translation of the tax smoothing ideal to the available data. Alternative measures of tax rate volatility that would have reflected the magnitude of changes, such as the standard deviation of tax rates during the sample period, were considered in the analysis but did not produce any additional or conflicting insights. It is not clear whether a small number of tax rate changes or a small standard deviation of tax rates produces a smaller deadweight loss from taxation. However, transaction costs likely depend more on the number of changes, and less on their magnitude. For this reason and for the sake of brevity, we limit the presentation to the number of tax rate changes.

bargaining costs between the administration and the public (inhabitants and firms). Over the business cycle, automatic stabilizers should be left to work without any intervention in tax rates.[19]

The number of tax rate changes will be used in the descriptive analysis in Section 4.3.1 (Step 2 and 3) and as the dependent variable in the empirical model presented in Section 4.3.2. We calculate the number of tax rate changes for the business and the property tax, respectively. In addition, the sum of changes for both taxes is considered to obtain a complete picture of local tax policy. For this purpose, we built a panel dataset covering all German municipalities for the period 1998 to 2013. Data on local tax rates at the municipal level from 2009 to 2013 are made available online by the Regional Database Germany (*Regionaldatenbank Deutschland*). Tax rates from 2001 to 2008 were obtained from the Statistics Local publications (*Statistik Lokal*). Data on all years before 2001 were requested directly from the respective statistical office of the federal state in question. Most analyses that follow were carried out for the balanced panel of 10,160 municipalities for which we have information on the business and property tax rates as well as on liquidity credits in all 16 years.[20]

4.3 Analyzing tax smoothing at the local level

It is plausible to assume that local governments that enjoy credit access find it easier to smooth taxes over time. They can afford to refrain from adjusting tax rates over the business cycle to ensure stable tax revenues. Allowing automatic stabilizers to work can easily cause deficits during economic downturns. The optimal response to adverse temporary economic shocks may also be to run a budget deficit rather than exacerbate economic costs through tax rate increases. Thus, we should see more stable tax rates

[19]Apart from this cyclical component, which is the focus of this paper, tax smoothing also has a structural, long term component. It demands that all available information on long-term future spending needs should be used to devise an optimal tax rate today that takes into account future developments, allowing for a steady tax rate and a smaller adjustment than if adjustment were delayed. Nevertheless, the number of changes necessary to deal with new information on spending needs should be kept to a minimum, too.

[20]The total number of municipalities in the balanced panel dataset is smaller than the actual total number of municipalities in some states where not all municipalities exist in all 16 years due to territorial reforms. This is particularly true for Brandenburg and Saxony-Anhalt. The balanced panel dataset is the data basis for Tables 4.3, 4.4 and 4.5 as well as Table 4.11 in the appendix. It is furthermore employed to calculate the average number of tax rate changes by state presented in Figures 4.3 and 4.4 and in the econometric analysis. For more information on data see Section 4.3.2.

in federal states where municipalities can make use of liquidity credits to finance current deficits. In other words, there should be a positive link between credit access and tax smoothing, as credit access may contribute to smoother tax rates. In the following, we refute such a positive association for the case of German municipalities, based on four steps of empirical, i.e. descriptive and econometric, analysis. The first three descriptive steps are presented in Section 4.3.1. Section 4.3.2 is devoted to the final, econometric step.

4.3.1 Descriptive analysis

We start our descriptive analysis by first taking a closer look at the actual development of liquidity credits (Step 1). Next, we study tax rate volatility (Step 2), before linking tax rate volatility and credit access (Step 3).

Step 1: The development of liquidity credits is not cyclical

If liquidity credits were used as a tax smoothing tool, the stock of liquidity credits should behave cyclically. However, this is not the case empirically. Figure 4.1 pinpoints that easier credit access coincided with dramatic increases in local per capita short-term liquidity credits in some federal states (Hesse, North Rhine-Westphalia, Rhineland-Palatinate and Saarland) over the past decades. Levels of local per capita short-term liquidity credits do not behave cyclically – at least at the aggregate level. Instead of showing alternating increases and reductions, they exhibit a steady rise with varying slopes over time. This suggests a misuse of liquidity credits to cover rising spending needs. It is a valid argument that this behavior does not rule out the simultaneous use of liquidity credits for tax smoothing. However, as the results of the next steps show, tax rates tend to be rather stable overall. In particular, municipalities in federal states affected by high local liquidity credit burdens tend to enact more tax rate changes. Thus, the evolution of liquidity credits suggests that credit access is not (mainly) used for tax smoothing purposes.

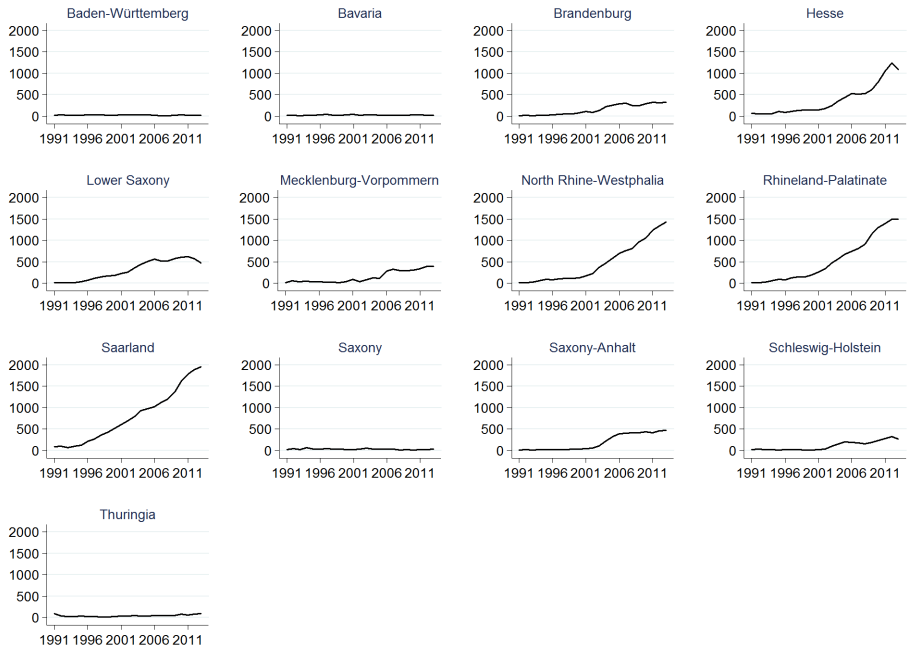

Figure 4.1: Evolution of short-term liquidity credits (in euro p.c.), 1991-2013

Source: Own compilation with data retrieved from Fachserie 14 Reihe 5 (2013) by the Federal Statistical Office. Data cover the entire municipal level (municipalities, municipal associations and counties).

Step 2: Tax rate changes are rare overall

If local credit access facilitated tax smoothing at the local level, tax rate changes should be particularly rare in federal states where municipalities have ample access to credit. However, local tax rates are remarkably stable across Germany, regardless of local credit access. Table 4.3 provides information on the proportion of municipalities with property and business tax rate changes within the reference period 1998 to 2013 by federal state.

Table 4.11 in the appendix gives the equivalent information in terms of absolute numbers of municipalities.[21] From the tables, it is clear that tax rate changes are overall rather rare. In case of property taxes, the majority of municipalities changed their tax rate two to four times within our 16-year horizon. Less than 5% enacted five or more changes, with a maximum of eleven changes. Roughly a quarter changed their tax rate

[21] The total number of municipalities indicated in the Table 4.11 is smaller than the actual total number of municipalities in some states where not all municipalities exist in all 16 years due to territorial reforms. This is particularly true for Brandenburg and Saxony-Anhalt, see Footnote 20.

Table 4.3: Proportion of municipalities with tax rate changes, 1998-2013

	Property tax				Business tax			
	No change	One change	Two to four changes	Five to eleven changes	No change	One change	Two to four changes	Five to eleven changes
Baden-Württemberg	10.3	34.7	51.1	3.9	21	54.1	24.4	.5
Bavaria	41.1	37.5	21.1	.3	48.4	33.6	17.7	.2
Brandenburg	20.7	44.8	31	3.4	53.4	31	15.5	0
Hesse	6.7	22.1	63.7	7.6	16.2	35.2	47.5	1.2
Lower Saxony	4	23.8	67.2	5.1	6.2	27.3	61.5	5
Mecklenburg-Vorpommern	22.3	41.1	35.9	.7	34.1	38	25.6	2.3
North Rhine-Westphalia	0	4.5	74.7	20.7	1	13.9	78.8	6.3
Rhineland-Palatinate	2.3	10.1	83.9	3.6	13.8	43.1	42.6	.4
Saarland	9.8	43.1	41.2	5.9	2	5.9	80.4	11.8
Saxony	4.8	19	63.8	12.4	19.3	30	46.9	3.8
Saxony-Anhalt	10.6	12.4	51.6	25.5	16.1	13	42.9	28
Schleswig-Holstein	11.8	24.8	53.5	10	14.1	35.8	47.4	2.7
Thuringia	8.9	57.3	33	.8	7.1	57.6	34.5	.8
Total	14.2	27.3	53.6	4.9	21.4	38.3	38.2	2.1

Notes: Proportion of municipalities with tax rate changes calculated for the balanced panel of 10,160 municipalities for the period 1998 to 2013.
Source: Own calculations based on data from the Regional Database Germany, Statistics Local and state statistical offices.

only once, while 14.2% left their tax rate completely unchanged. Two to four is also the most frequent number of changes in most of the federal states. Only in Brandenburg, Mecklenburg-Vorpommern, Saarland and Thuringia, the majority of municipalities had only one tax rate change, but not by a big margin. Bavaria stands out in that a majority of its municipalities enacted no property tax rate change during the reference period.

Business tax rates show similar patterns, but with even more overall tax rate stability. Roughly a fifth of municipalities did not change their business tax rate at all from 1998 to 2013. One change or two to four changes were each carried out by about 38% of municipalities. Only 2% changed their business tax rate five to eleven times. It is also worth noting that changes in both property and business tax rates are most often in the direction of higher tax rates. 96% of property tax rate changes and 93% of business tax rate changes were increases. This might be a reflection of increased spending pressure at the local level in recent years. The pattern suggests that German municipalities in general aim to smooth taxes (i.e. keep them stable) – cyclical tax policy would involve tax reductions as well as tax hikes.

Tables 4.4 and 4.5 complement the above information by looking at the timing of tax rate changes. The tables present the share of municipalities in each federal state that changed their tax rate in a given year compared to the previous year's tax rate.

In Bavaria and Brandenburg, the share of municipalities with either property or business tax rate changes never exceeds 20%.[22] In Mecklenburg-Vorpommern and Saxony, this is true for business tax rates only. In all other states, there is at least one year and up to seven years of high tax rate volatility where more than 20% of all municipalities enacted tax rate changes.[23] Often, such years coincide for property and business tax rates, although business tax rates again show less overall volatility. However, years of high volatility do not necessarily coincide between states. This suggests that municipalities adjust their tax rates mostly in response to state-specific shocks. Such shocks could consist of changes in expenditure requirements when states devolve parts of their tasks to the local level or modify standards relating to the execution of local tasks. Changes in municipal fiscal equalization schemes are also possible triggers of tax rate changes (see Chapter 2). Changes in the degree of credit access granted by states could also constitute a shock to which local governments react. The tables also point to higher overall volatility of tax rates in recent years, starting in 2010, with many federal states experiencing high volatility years at the same time. The rise in tax rate volatility towards the end of our time horizon is a further indication that credit access does not seem to contribute to smoother tax rates, given that credit access has generally increased and not decreased over the last two decades.

[22]Information on Brandenburg needs to be treated with caution given the high number of missing municipalities due to territorial reforms, see above.

[23]The share of municipalities with tax rate changes can go up to more than 50, 70 or even 90%.

Table 4.4: Proportion of municipalities with property tax rate change from previous year to current year

	Baden-Württemberg	Bavaria	Brandenburg	Hesse	Lower Saxony	Mecklenburg-Vorpommern	North Rhine-Westphalia	Rhineland-Palatinate	Saarland	Saxony	Saxony-Anhalt	Schleswig-Holstein	Thuringia	Total
1999	6.9	4.2	8.5	11.4	12.4	1.4	9.6	4.5	5.9	24.5	9.2	7.9	2.6	6.6
2000	4.0	3.7	6.8	10.2	17.0	2.7	10.6	45.5	5.9	26.9	14.1	7.0	1.6	15.9
2001	6.5	3.7	3.4	3.1	10.9	2.4	14.9	23.6	2.0	22.8	8.6	27.8	4.0	12.7
2002	6.8	4.2	16.9	14.0	20.7	2.9	18.2	9.4	7.8	19.0	12.3	13.8	2.9	9.7
2003	15.2	12.7	10.2	9.0	22.6	2.4	77.5	6.6	19.6	22.1	19.0	11.1	3.2	13.8
2004	28.3	13.7	15.3	17.8	22.4	2.9	8.3	4.2	2.0	26.6	21.5	19.1	1.6	13.3
2005	34.4	8.5	11.9	17.1	19.8	8.9	15.9	16.0	13.7	19.7	20.2	10.2	5.9	15.1
2006	17.6	5.0	15.3	6.9	8.5	10.3	14.6	9.1	9.8	12.8	17.8	17.8	3.0	10.0
2007	6.1	3.5	3.4	10.2	8.7	11.5	8.1	2.0	5.9	11.7	14.1	6.7	3.2	5.5
2008	4.6	2.6	3.4	7.8	7.6	8.4	6.3	1.7	5.9	6.9	14.7	6.5	2.2	4.5
2009	2.8	2.6	6.8	5.9	10.0	5.0	4.8	1.5	3.9	9.0	33.1	10.0	2.2	4.9
2010	18.6	7.0	8.5	18.1	19.8	20.4	18.9	2.0	11.8	19.3	57.1	20.7	5.2	12.5
2011	20.5	7.7	13.6	22.1	11.4	19.2	49.0	76.5	17.6	13.1	38.0	30.8	60.1	35.0
2012	9.3	5.3	10.2	33.5	17.8	13.4	41.9	36.0	33.3	19.3	26.4	13.5	23.8	20.1
2013	5.1	3.9	11.9	50.4	22.6	20.2	40.7	14.6	33.3	13.4	27.0	19.1	15.6	15.8
Total	11.7	5.5	9.1	14.8	14.5	8.3	21.2	15.8	11.2	16.7	20.8	13.9	8.6	12.2

Notes: Proportion of municipalities with property tax rate change from previous year to current year calculated for the balanced panel of 10,160 municipalities for the period 1998 to 2013.
Source: Own calculations based on data from the Regional Database Germany, Statistics Local and state statistical offices.

Figure 4.2 shows the patterns of property and business tax rate levels that result from the observed tax rate adjustments. For each state, the figure displays the weighted average of tax rates of all municipalities in the respective state over the period 1998 to 2013. The small number of changes is reflected in slowly-moving average tax rates in most

Table 4.5: Proportion of municipalities with business tax rate change from previous year to current year

	Baden-Württemberg	Bavaria	Brandenburg	Hesse	Lower Saxony	Mecklenburg-Vorpommern	North Rhine-Westphalia	Rhineland-Palatinate	Saarland	Saxony	Saxony-Anhalt	Schleswig-Holstein	Thuringia	Total
1999	3.5	2.9	6.8	6.4	8.3	3.1	7.3	3.7	2.0	19.7	9.8	4.1	4.1	4.8
2000	2.1	2.4	3.4	9.7	13.0	4.3	8.1	21.0	2.0	19.7	11.7	4.5	2.7	9.1
2001	5.0	4.9	5.1	2.9	13.0	3.1	11.6	23.6	98.0	16.6	8.6	27.8	4.9	13.2
2002	3.0	3.3	1.7	7.6	21.4	3.3	12.6	10.3	0.0	9.7	10.4	14.9	3.3	8.6
2003	4.0	6.5	3.4	4.5	20.4	2.9	64.6	7.1	2.0	12.1	12.9	9.6	3.0	9.9
2004	8.7	8.2	0.0	9.0	17.5	5.1	7.1	4.9	2.0	14.8	16.6	15.7	2.7	8.8
2005	24.1	5.4	5.1	9.0	15.3	6.7	12.1	14.5	82.4	7.2	16.0	7.6	5.2	11.6
2006	19.4	3.7	10.2	4.5	7.5	7.2	10.1	6.1	7.8	6.2	14.1	16.3	3.3	8.3
2007	5.3	2.6	3.4	5.9	6.2	8.9	6.1	2.1	11.8	8.6	14.1	5.4	2.7	4.4
2008	3.1	4.5	1.7	5.2	7.7	4.8	6.1	1.7	5.9	5.2	10.4	4.8	3.3	4.2
2009	2.3	4.2	3.4	6.4	11.3	3.4	4.5	1.1	5.9	6.6	23.9	8.1	2.4	4.7
2010	7.4	7.9	5.1	11.4	19.3	14.8	10.6	1.8	13.7	13.4	49.1	16.0	6.1	9.7
2011	12.9	8.3	10.2	16.4	13.0	16.6	38.6	20.7	13.7	13.1	42.9	16.2	60.6	19.7
2012	6.3	5.8	1.7	21.1	18.1	12.7	31.8	15.0	37.3	13.1	42.3	9.3	24.4	13.9
2013	4.4	4.5	10.2	38.5	20.2	17.8	30.6	10.0	19.6	11.0	35.6	12.5	15.1	12.8
Total	7.0	4.7	4.4	9.9	13.3	7.2	16.4	9.0	19.0	11.1	19.9	10.8	9.0	9.0

Notes: Proportion of municipalities with business tax rate change from previous year to current year calculated for the balanced panel of 10,160 municipalities for the period 1998 to 2013.
Source: Own calculations based on data from the Regional Database Germany, Statistics Local and state statistical offices.

states. An upward trend is discernible in most states concerning both taxes, which is in general more pronounced for the property tax. North Rhine-Westphalia and Saxony have seen particularly strong increases in their average property tax rate level. It is worth noting that North Rhine-Westphalia has seen dramatic increases of municipal liquidity

credits over the same time period, while Saxony's liquidity credit stocks have remained low. Rising local spending pressures across Germany could explain the generalized upward trend in local tax rates.

In sum, local tax rates are relatively stable across Germany, with little variation across states. They have followed a slow upward trend in recent decades, without any visible cyclicality. Whether the federal state in question has seen simultaneous increases in local credit access or built-ups in effective municipal liquidity credit stocks has no apparent effect on tax rate volatility.

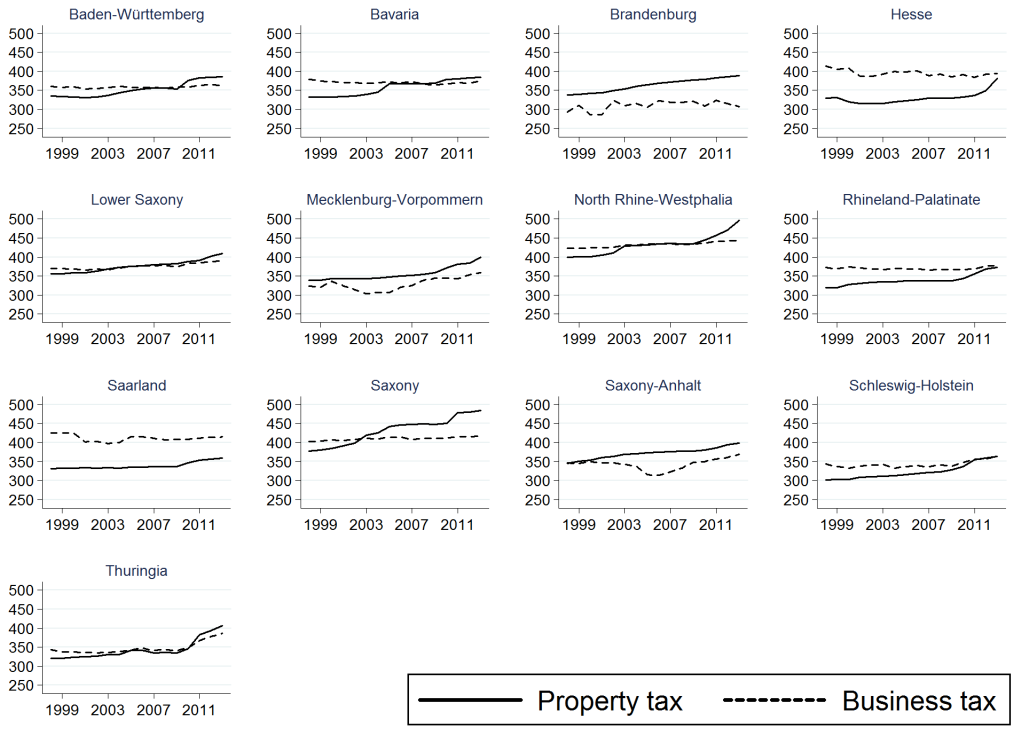

Figure 4.2: Development of business and property tax rate (in %), 1998-2013

Notes: Data represent the weighted average for all municipalities.
Source: Own compilation based on datafrom the Regional Database Germany.

Step 3: Positive relationship between credit access and tax rate volatility

If local credit access contributed to tax smoothing, this positive association should be visible in a joint analysis of the data. In the third step of our line of argument, we approach such a possible relationship between credit access and tax rate volatility through

a graphical analysis. Figure 4.3 plots the relationship between credit access and property and business tax rate changes. The y-axis represents the average number of tax rate changes in the municipalities in the state in question from 1998 to 2013. The scattered triangles and crosses refer to the property and business tax, respectively. The x-axis shows the average credit access index for each federal state. This corresponds to the average of the index developed in Section 4.2.2 over the 16 years from 1998 to 2013.

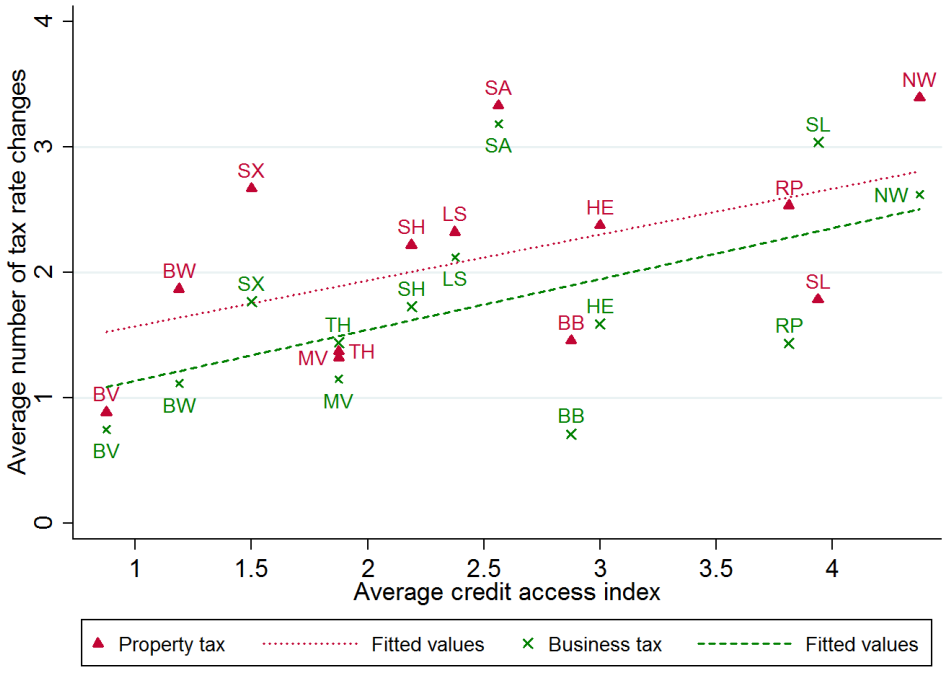

Figure 4.3: Average credit access and tax rate changes (I)

Notes: Cross section aggregated at the state level derived from balanced panel of 10,160 municipalities for the period 1998 to 2013. Average number of tax rate changes (differentiated by business and property tax) in the municipalities for each federal state (y-axis). Average credit access index for each federal state (x-axis). Lines represent the linear fit predicting the average number of tax rate changes from the average credit access index.
Source: Credit access index developed by authors. Average number of tax rate changes is calculated from data provided by the Regional Database Germany, Statistics Local and state statistical offices.

No clear relationship emerges from Figure 4.3. If anything, a positive association between credit access and tax rate volatility seems discernible, with Bavaria and North Rhine-Westphalia marking the two ends of the spectrum from low credit access and few tax rate changes to high credit access and many tax rate changes. A possible positive

relationship is supported by the linear fit predicting the average number of (property and business) tax rates changes from the the average credit access index (the dotted and the dashed line refer to the property and business tax, respectively). Both lines ascend slightly and run almost in parallel. A positive link between credit access and tax rate changes would contradict the rationale of the tax smoothing hypothesis, whereby access to credit financing should allow municipalities to smooth their taxes and thus limit the number of tax rate changes.

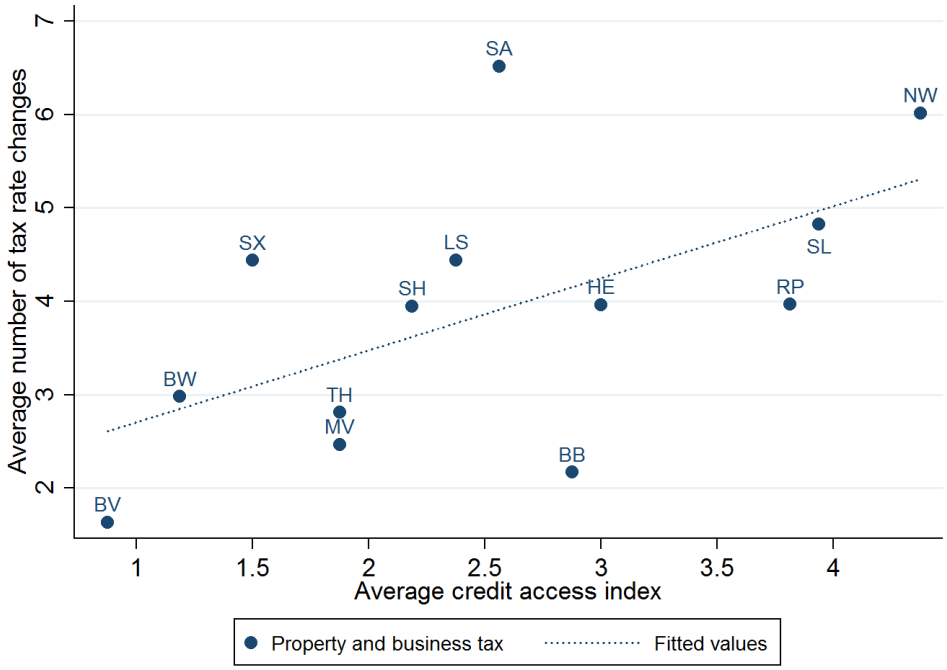

Figure 4.4: Average credit access and tax rate changes (II)

Notes: Cross section aggregated at the state level derived from balanced panel of 10,160 municipalities for the period 1998 to 2013. Average number of tax rate changes in the municipalities for each federal state (y-axis). Average credit access index for each federal state (x-axis). The dotted line represents the linear fit predicting the average number of tax rate changes from the average credit access index. Source: Credit access index developed by authors. Average number of tax rate changes is calculated from data provided by the Regional Database Germany, Statistics Local and state statistical offices.

Figure 4.4 again investigates a possible relationship between credit access and the frequency of tax rate changes, this time considering the state average of the sum of changes in the business and property tax in the state's municipalities. Jointly considering both taxes allows for a more complete picture of the volatility of local tax rate policy. Empiri-

cally, a small number of property tax changes generally coincides with a small number of business tax changes and vice versa. As a result, the fitted line in Figure 4.4 has a positive and steeper slope than the fitted lines in Figure 4.3.

How can one explain that greater credit access does not seem to lead to less tax rate volatility, as evidenced by the preliminary graphical analysis? One potential explanation lies in the fact that we may have overlooked an important intervening variable so far: Local spending pressure. As alluded to in the preceding section, municipalities in Germany have in general witnessed an expansion of their spending responsibilities in recent years. In light of Germany's federal institutional design this was a structural, mainly exogenous phenomenon from the local perspective. A further important characteristic is that local spending pressure varies across federal states.[24] Consequently, the positive link between tax rate changes and the credit access index might be explained by spending pressure.

The results of this graphical analysis need to be interpreted with great caution. The plots show a supposed unconditional relationship, i.e. not controlling for potentially important covariates (e.g., spending pressure). Moreover, the information available in our dataset has been condensed to an exceptionally high level of aggregation to produce the above graphs. Behind the 13 data points depicted here for each state lie more than 10,000 individual municipalities over 16 years. Thus, the preliminary conclusions drawn from the graphical analysis should be verified by an econometric analysis at the municipal level that makes the most of the available data potential and takes spending pressure into account. This is what we do next (Step 4).

4.3.2 Econometric analysis

This section is devoted to our fourth and last analytical step. We first provide information on our data sources and descriptive statistics, before presenting the econometric analysis.

[24] Higher spending needs have arisen in particular in the area of social welfare, which is to a large degree a local task although standards are prescribed by federal law. The exact extent of municipal responsibilities depends on state law, as the states can choose to carry out (social and other) tasks themselves or to devolve them to the local level. The extent to which spending is decentralized and the extent to which potential spending increases are offset by increased state transfer allocations differ between federal states.

Step 4: Positive relationship between credit access and tax rate volatility not rejected

Data. The empirical analysis is based on a panel dataset with yearly administrative data on all German municipalities from 1998 to 2013. Data were retrieved from different sources, depending on the variable and the time horizon in question. Data on liquidity credits, which are part of the construction of the credit access index, were provided by North Rhine-Westphalia's statistical office. The indicator funding need growth (see below) was calculated by the authors and is only available between 1998 and 2006. Its components were obtained directly from the municipal financial statement statistic (*Jahresrechnungsstatistik der Gemeinden/Gemeindeverbände*), which is compiled by the Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder (*Forschungsdatenzentren der Statistischen Ämter des Bundes und der Länder* [FDZ]). Data on employees are provided by the Federal Employment Agency (*Bundesagentur für Arbeit*). All other municipal-level variables, including local business and property tax rates, were obtained from a combination of sources. Municipal-level data from 2009 to 2013 are available online through the Regional Database Germany (*Regionaldatenbank Deutschland*). Data for the years from 2001 to 2008 came from the Statistics Local publications (*Statistik Lokal*). Data on all previous years were requested separately from each of the 13 state statistical offices.[25] Some control variables such as the gross domestic product (GDP) and income of private households are only available at the county level. All such variables are provided online by the Regional Database Germany for the full period of interest.

Our baseline sample covers all municipalities for which we have information on business and property tax rates as well as liquidity credits. This original dataset is an unbalanced panel containing 198,113 observations. The unbalanced nature of the panel is due above all to territorial reforms that took place in the New Länder and greatly reduced the number of municipalities. Hence, the number of observations in the original sample shrinks from 14,102 observations in 1998 to 11,112 observations in 2013. Table 4.12 in the appendix reports for each state the share of municipalities for which we have one, two etc. years of observations. All Bavarian and North Rhine-Westphalian municipalities are represented in the dataset in all 16 years. For the remaining states, the share of municipalities that exist during the full time period varies from 9.1% in Brandenburg to 99.8% in

[25]Not all statistical offices were able to provide information on municipal-level data for the requested time period on the basis of the territorial status of that time.

Rhineland-Palatinate. In order to avoid biases caused by municipalities that only existed in a fraction of years, the remaining analysis is limited to the balanced panel of 10,160 municipalities with 16 years of observations.[26]

Employing the balanced rather than the unbalanced panel dataset is more appropriate for our analysis, but it might raise selection concerns.[27] We handle this issue by providing detailed information on the nature of the problem (see discussion for Table 4.12 and 4.13). We also present our results by state while carefully pointing out the related problems (see, e.g., Footnote 22). Table 4.13 in the appendix lists the number of municipalities contained in the balanced panel by state. While Saarland and Brandenburg are represented with less than 60 municipalities, Rhineland-Palatinate and Bavaria each contribute more than 2,000 observations to the sample. Such differences are partly due to the aforementioned territorial reforms, which cause incomplete samples for some states. However, they also arise because of differing institutional landscapes with major differences in city size and number. The two states with full samples are cases in point: The most populous federal state North Rhine-Westphalia is divided into only 396 municipalities while Bavaria, the state with the biggest surface area, is extremely fragmented with 2,056 municipalities. We discussed the use of weights to account for such differences in the econometric analysis, but decided to employ state dummies instead.

Dependent variable and main independent variables of interest. The dependent variables in our econometric model are the number of business tax and property tax rate changes of each municipality over our 16-year horizon. We consider both of them separately as well as their sum. Our research interest – the impact of credit access on tax rate volatility – demands some degree of data aggregation to derive meaningful volatility measures. It only makes sense to analyze the number of tax rate changes within a sufficiently long time frame. That is why we aggregate our dataset for our main analysis into a cross section without a time dimension. Our independent variable of interest is the credit access index, which is outlined in detail in Section 4.2.2. Following our train of thought

[26]To adjust for the territorial reforms by setting the current territorial status as, for example, done by Fuest et al. (2016) is not an option. This requires data harmonization by, e.g., demeaning and would lead to artificial variation in our variable of interest (tax rates). To maximize the number of municipalities in the balanced panel, we corrected the identifiers of municipalities that were affected by county-level territorial reforms. In such cases, the identity or size of the county a municipality belongs to is changed without changing the municipality itself.

[27]Whether a municipality is affected by a territorial reform mainly depends on population size besides geographical and administrative characteristics.

on spending pressure (outlined in the previous section), another important independent variable is funding need growth (in %). We define local funding need as the difference between total municipal current outlays and non-autonomous municipal current revenue. Funding need growth is defined as the percentage increase of funding need between 1998 and 2006. This is used as a proxy for funding need growth from 1998 to 2013, as necessary information on local revenue is not available beyond 2006.[28] The variable is meant to capture long-term, permanent increases in expenditures that need to be financed by local own revenue. We hypothesize that funding need growth may have contributed to rising tax rates across Germany during our sample period. When faced with permanent, greater spending responsibilities, raising taxes (as opposed to taking out liquidity credits) is the right course of action from a welfare perspective.[29] Our dependent variable, the number of tax rate changes, may contain both cyclical tax rate adjustments and upward-trending tax rate adjustments. By partialling out the effect of funding need growth on the number of tax rate changes, we hope to explain the latter.[30] Cyclical tax rate adjustments are then left to be explained. Cyclical tax rate adjustments that are meant to smooth revenues over the business cycle could be avoided through the use of liquidity credits, which would enhance social welfare. If municipalities use liquidity credits in this way in practice, the regression would show a negative correlation between credit access and tax rate volatility.

[28]Non-autonomous revenues are transfers from the state level in the form of shared taxes, conditional and unconditional transfers (see Chapter 3 for a detailed discussion of non-autonomous revenues). Thus, local funding need measures local expenditures that need to be financed out of municipal own revenue, in particular business and property taxes. We excluded 121 observations that were outliers with respect to funding need growth.

[29]In contrast, perfect tax smoothing demands that fiscal policy does not adjust to cyclical spending increases.

[30]Other control variables also help to explain upward-trending tax rate adjustments, but funding need growth is the most important control variable in this respect. We cannot distinguish between cyclical tax rate fluctuations and upward trends in tax rates in our dependent variable, the number of tax rate changes. Accounting for funding need growth in the regressions allows us to circumvent this problem.

Table 4.6: Summary statistics

	Mean	Std. Dev.	Min.	Max.	N
Number of changes PT rate	1.956	1.414	0	11	10160
Number of changes BT rate	1.441	1.215	0	11	10160
Number of changes	3.397	2.365	0	21	10160
Index	2.277	1.139	0.875	4.375	10160
Funding need growth	42.562	118.138	-984.519	999.782	10160
Mun. assoc. status	0.468	0.499	0	1	10160
Population	6895.983	28791.314	6.25	1287749.375	10160
Employees	0.187	0.175	0	7.697	10031
Priv. income	17308.891	1890.876	13055.429	28235.133	10160
GDP	21587.731	6345.324	6119.703	79894.067	10160
Left majority	0.307	0.361	0	1	10160

Notes: Cross section derived from balanced panel of 10,160 municipalities for the period 1998 to 2013. All variables except numbers of changes and funding need growth correspond to the mean over the 16-year horizon. Funding need growth (in %) is defined as the growth in funding need between 1998 and 2006. Number of changes, funding need growth (in %), municipal association status, population, employees (p.c.) are municipal-level variables; GDP, private income (both in euro p.c.) and left majority at state elections are county-level variables; the index of credit access is a state-level variable.
Source: Own calculations based on data provided by the FDZ, the Regional Database Germany, the Federal Employment Agency, Statistics Local and state statistical offices.

Descriptive statistics. Table 4.6 shows summary statistics for the aggregated dataset derived from the balanced panel. The table first lists the three dependent variables tested in the regression analysis: The number of property tax (short: PT) changes, the number of business tax (short: BT) changes and the sum of changes of both taxes, each calculated over the full 16-year horizon. Next is our main independent variable of interest: The credit access index. The rest of the table shows the most important control variables: Funding need growth (in %), the dummy for municipal association status, population, number of employees at place of employment (per capita (p.c.)), income of private households, GDP (both in euro p.c.) and left majority at state parliamentary elections, respectively. Municipal association status is coded as 1 if the municipality belongs to a municipal association (*Amtsgemeinde, Samtgemeinde* or *Verbandsgemeinde*) and 0 otherwise. Municipal associations exist in seven out of the 13 territorial states. All independent variables correspond to the municipality-specific average of the underlying variable over the 16 years of the reference period.

Tables 4.15 and 4.16 in the appendix provide summary statistics for the same variables by state. All variables except for the number of employees are available for all 10,160 municipalities.

Econometric model. To estimate the effect of credit access on tax rate volatility, we use the following model:

$$C_{i,t} = \alpha I_s + \beta \mathbf{X_i} + \delta \mathbf{Y_c} + \lambda_s + \varepsilon_i \tag{4.1}$$

where $C_{i,t}$ is the number of tax rate changes in municipality i between 1998 and 2013. The index t denotes the tax type (business, property or both).

Our independent variable of interest is local credit access, which is measured by the mean of the credit access index by federal state across time (I_S). We aggregate our dataset into a cross section in order to create the best possible volatility measures based on tax rates during the full time period. The obvious drawback is that we have to work in a cross section environment with significantly less observations.

We add a number of controls to account for further confounding factors: $\mathbf{X_i}$ and $\mathbf{Y_c}$ represent vectors of municipal-level controls (funding need growth (in %), population, gross outlays (in euro p.c.), employees at place of employment, employees at place of residence, in-commuters (all three p.c.), gross revenue excluding business and property taxes, revenue from shared taxes (both in euro p.c.) and municipal association status) and county-level controls (GDP and income of private households (both in euro p.c.), left majority at state parliamentary elections), respectively. We calculated the mean and the standard deviation of all potential controls and tested them in the regressions. Furthermore, we included state dummies λ_s. The error term ε_i is clustered at county level.

Discussion of identification. The main concern with identification lies in the fact that our analysis is limited to a simple cross section due to the aggregation involved in investigating volatility over a sufficiently long time period. Aggregation over the full time horizon greatly reduces the number of observations from 162,560 to 10,160.[31] Since municipal fixed effects cannot be employed, it is essential to account for other covariates

[31] As an alternative to full aggregation, one might consider splitting the reference period into sub-periods, thus maintaining a panel data structure. However, data availability limits our reference period to the 16 years between 1998 and 2013. 16 years is a sufficiently long time frame to derive volatility measures, but eight or even four years is not enough in practice. Given the low incidence of changes in tax rates and credit access, further limiting the time frame means there is not sufficient variation in the data to identify the effect of our key variable.

that are potentially related to the volatility of local tax rates, including time-constant information.

A priori, controlling for population and budgetary variables seems particularly important. The capacity of municipalities to adjust their tax rates to external requirements may depend on the size of their population. Fluctuations in population, captured by its standard deviation over the covered time period, may also influence tax rate volatility. In addition, gross outlays per capita are expected to have a significant impact. Due to an array of tasks mandated by the federal level, municipalities in Germany have only limited autonomy of decision over their spending. Rising spending pressures might cause frequent (upward) adjustments in tax rates, which is why we consider funding need growth to be an important control variable. The concept of funding need growth captures the possibility that states may offset increased local spending responsibilities by allocating more transfers to municipalities. As defined here, funding need growth will only occur where spending rises without compensating transfers. Local revenue sources aside from business and property taxes may also be crucial in the decision to alter tax rates, for instance in hope of filling rising revenue gaps. Economic strength may also be an important intervening factor. Municipalities that are well-off economically may face less financial distress and may be in a position where raising tax rates is not necessary. Variables such as GDP and income of private households, as well as the number of employees and in-commuters, are meant to capture the economic position. Finally, past research found that the ideological identity of the government (left- or right-wing) may influence fiscal policy. This is proxied by an indicator variable for a left majority at the most recent state parliamentary elections.

The volatility of local tax rates may also differ systematically depending on the institutional characteristics of the municipalities. Some cities, particularly big ones, enjoy county status and have additional responsibilities compared with municipalities belonging to a county. Within the group of county-affiliated municipalities, one can further differentiate between municipalities grouped within a municipal association (*Amtsgemeinde*, *Samtgemeinde* or *Verbandsgemeinde*) and non-associated municipalities, with the latter facing more responsibilities than the former. All cities with county status are also non-associated. The regression controls for these administrative differences.

Results. Tables 4.7 and 4.8 show the regression results from the regression model in Equation 4.1. Columns *I* to *III* present the results from a regression of the number of property tax changes while Columns *IV* to *VI* show the results for the number of business

tax changes (both in Table 4.7). To give a complete picture Columns *VII* to *IX* in Table 4.8 pinpoint the results for the sum of tax rate changes of both taxes (note the coefficients of Table 4.7 sum up to the respective ones of Table 4.8, e.g., 0.47891 (*I*) + 0.47217 (*IV*) = 0.95108 (*VII*)).

Table 4.7: Regression results with number of property and business tax rate changes as dependent variable

	Property tax			Business tax		
	I	II	III	IV	V	VI
Index	0.47891***	0.47810***	0.44103***	0.47217***	0.47108***	0.49288***
	(0.050)	(0.050)	(0.053)	(0.027)	(0.027)	(0.032)
Funding need growth		0.00024*	0.00020		0.00032**	0.00028**
		(0.000)	(0.000)		(0.000)	(0.000)
Mun. assoc. status			0.44813***			0.32980**
			(0.099)			(0.102)
Population			0.00000			-0.00000
			(0.000)			(0.000)
Employees			0.11709			0.25078*
			(0.117)			(0.120)
Priv. income			0.00002			-0.00002
			(0.000)			(0.000)
GDP			-0.00001			-0.00000
			(0.000)			(0.000)
Left majority			0.11729			-0.20938
			(0.176)			(0.158)
Constant	1.29872***	1.29070***	0.81940	0.55293***	0.54209***	0.57354
	(0.147)	(0.148)	(0.501)	(0.062)	(0.062)	(0.385)
Observations	10160	10160	10031	10160	10160	10031
Adjusted R^2	.254785	.2550867	.2638504	.1952969	.196146	.2045603
State dummies	yes	yes	yes	yes	yes	yes

Notes: Estimation based on Equation 5.1. Cross section derived from balanced panel of 10,160 municipalities for the period 1998 to 2013. Dependent variable: Number of property (*I* to *III*) and business (*IV* to *VI*) tax rate changes (municipal level). All independent variables (except for funding need growth) are averaged over time. Independent variable of interest: Index of credit access (state level). All specifications control for state dummies. Specification *II* and *V* additionally control for funding need growth (in %). Specification *III* and *VI* add municipal association status, population, employees (p.c.) (municipal level) and private income, GDP (both in euro p.c.) and left majority at state elections (county level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

The first column for each tax (Regressions *I*, *IV* and *VII*) presents baseline results of a regression of tax rate changes on credit access without any control variables aside from state dummy variables. In each case, the credit access index is strongly significant with an estimated coefficient of about .48 and .47 for the property and the business

tax, respectively, and .95 for both taxes. These results are in line with the graphical analysis presented in the previous section. Regressions II, V and $VIII$ introduce the most important control variable: Funding need growth (in %).[32]

Credit access is still estimated to have a positive, significant impact on the number of tax rate changes, with the coefficients still ranging between .48 and .47 for the property and the business tax, respectively, and .95 for both taxes. Hence, introducing funding need growth only has a marginal negative effect (and does not lead to a sign reversal). The coefficient for funding need growth is statistically significant and positive, but so close to zero that an economic significance is questionable. The last column (Regressions III, VI and IX) adds a dummy for the municipal association status, population, the number of employees at place of employment (p.c.), income of private households and GDP (both in euro p.c.) and a dummy for a left majority at the most recent state elections. Of these, only the municipal association status is significant. The introduction of the controls does not significantly alter the results. Compared to the previous regressions, the estimated coefficient of credit access dropped slightly to .44 for the property tax and to .93 for both taxes, but it slightly increased to .49 for the business tax. These results seem to contradict the existence of cyclical tax smoothing at the local level in Germany.[33]

However, there are a number of caveats. First, as evidenced by a low $Adjusted\,R^2$ between .20 and .26, the regressions leave the bulk of tax rate volatility unexplained. This is despite a high number of observations. Secondly, the applied method of ordinary least squares estimation in a cross section is particularly vulnerable to omitted variables that might bias estimated coefficients. Thirdly, credit access only varies at the state level, making reliable identification of its effect more challenging. We are therefore left with interesting correlations that do not necessarily imply a causal effect. Nonetheless, the econometric analysis confirms the results of the descriptive analysis: Credit access does not seem to make a contribution towards smoother tax rates at the local level in Germany.

[32]Besides funding need growth we tested an array of other variables related to funding need (mean value of funding need over 1998-2006, funding need in 1998, average annual growth of funding need between 1998 and 2006). None of the specifications altered the coefficient of the credit access index significantly.

[33]We ran all regressions presented here using the subsample of all non-associated municipalities. Given the administrative differences between municipalities in Germany, excluding associated municipalities from the sample is a straightforward robustness check. The remaining municipalities are all non-associated (with or without county status), making the sample more homogeneous, but also smaller. The results confirm the existence of a positive link between credit access and tax rate volatility.

Table 4.8: Regression results with total number of tax rate changes as dependent variable

	VII	VIII	IX
Index	0.95108***	0.94918***	0.93391***
	(0.072)	(0.072)	(0.080)
Funding need growth		0.00056***	0.00048**
		(0.000)	(0.000)
Municipal association status			0.77793***
			(0.192)
Population			0.00000
			(0.000)
Employees			0.36788
			(0.228)
Priv. income			-0.00000
			(0.000)
GDP			-0.00001
			(0.000)
Left majority			-0.09209
			(0.286)
Constant	1.85165***	1.83278***	1.39295
	(0.197)	(0.198)	(0.814)
Observations	10160	10160	10031
Adjusted R^2	.2531876	.2538554	.2627839
State dummies	yes	yes	yes

Notes: Estimation based on Equation 5.1. Cross section derived from balanced panel of 10,160 municipalities for the period 1998 to 2013. Dependent variable: Total number of property and business tax rate changes (municipal level). All independent variables (except for funding need growth) are averaged over time. Independent variable of interest: Index of credit access (state level). All specifications control for state dummies. Specification *VIII* additionally controls for funding need growth (in %). Specification *IX* adds municipal association status, population, employees (p.c.) (municipal level) and private income, GDP (both in euro p.c.) and left majority at state elections (county level). Standard errors in parentheses are clustered by county. Significance levels: * 0.10, ** 0.05, *** 0.01.

Discussion of results. Contrary to what one might expect, easy access to credit is not used by municipalities to limit the frequency of tax rate adjustments. Instead, credit access and tax rate volatility go hand in hand. Why is that the case?

In Section 4.3.1, we hypothesized that spending pressure may have induced upward trends in local tax rates, and that this long-term development could be responsible for a seeming positive connection between credit access and tax rate volatility. We accounted for permanent fiscal pressure that may lead to financial difficulties by controlling for funding need growth. We aimed to investigate if, once we filtered out any non-cyclical tax rate adjustments, we might be able to see a contribution of credit access toward smoother tax

rates. However, we still cannot reject a positive link between credit access and tax rate volatility. This may be due to the imperfections of the funding need growth variable. As explained, the data necessary to calculate funding need is only available up to 2006. Funding need growth from 1998 to 2006 was therefore used as a proxy for funding need growth over the full time horizon. Possibly, this proxy does not sufficiently capture local long-term spending pressure and hence cannot explain long-run movements in local tax rates.

Alternatively, credit access may be associated with unsustainable fiscal behavior. Some municipalities bear rising liquidity credit stocks and at the same time continually raise their tax rates, for instance in North Rhine-Westphalia. Rising liquidity credits and upward trends in tax rates are both mirrors of financial weakness – municipal revenues are insufficient to cover rising spending needs.

Such a situation may arise through a combination of unsustainable behavior on the part of municipalities and the states in which they are located. First, states may themselves face fiscal distress and provide insufficient funding to municipalities, which then find it difficult to balance their budgets. If states – knowing that they would have to increase funding to alleviate local revenue shortages – then turn a blind eye on local deficits, a vicious circle may be set in motion. Discovering that they enjoy de facto credit access, municipalities may maintain unsustainable levels of spending, which need to be financed through higher taxes *and* liquidity credits. The institutional link between local debt and tax rates established by budget consolidation plans contributes to this outcome (in states where such plans are used). Under budget consolidation plans, municipalities may be forced to raise their tax rates in order to ensure approval by the regulatory authority (see Section 4.2.1). In response, states may grant even more credit access.

Effective monitoring by state governments of local fiscal positions with the imposition and enforcement of clear rules is thus decisive in ensuring long-run fiscal sustainability at the local level. Lack of effective oversight and accommodation in face of rising liquidity credit stocks may facilitate unsustainable debt build-up at the local level.

It appears that smoothing tax rates (or revenues) over the business cycle is not the predominant concern for municipalities in Germany. Instead, maintaining a certain level of spending and generating just enough income is the priority. Municipalities keep tax rates stable as long as possible. When revenue shortages arise, federal states may ease credit access in an attempt to compensate for revenue shortfalls and to limit upward pressure on tax rates. Municipalities make use of liquidity credits to complement tax revenues.

Ultimately, tax rates are raised, no matter if credit is accessible or not. Local credit access is not a tax smoothing tool. Instead, it is an indication of insufficient revenue and insufficient budgetary oversight.

4.4 Conclusion

The theory of tax smoothing suggests that giving governments access to debt financing could be welfare enhancing, as allowing governments to smooth their taxes over time can reduce distortionary costs from taxation. While it is clear from a theoretical viewpoint that tax smoothing is beneficial, it is unknown whether governments with credit access do in fact engage in tax smoothing. Political decision-makers might not realize the potential benefits from tax smoothing and instead take advantage of debt to finance unsustainable levels of current expenditures. The possible relationship between credit access and tax smoothing is particularly important where lower level governments enjoy tax autonomy. The standard fiscal federalism literature objects to granting credit access to lower federal levels. At the same time, credit rationing might inhibit tax smoothing.

This paper uses the unique institutional setting of German fiscal federalism to study the behavior of municipalities in Germany and to test whether credit access is associated with lower tax rate volatility. Germany is a promising case to study given that municipalities enjoy autonomy over property and business tax rates and differ in the degree of credit access allowed by the respective federal state. To operationalize local credit access, the institutional environment and empirical level of local indebtedness in each of the 13 territorial states were examined in detail to derive an index of local credit access. We propose the number of tax rate changes within a 16-year time frame as a measure of tax rate volatility. The descriptive and econometric modeling is based on a sample of more than 10,000 municipalities across Germany.

Employing a line of argument based on four steps of data analysis, we provide evidence against a contribution of credit access to tax smoothing at the local level. We start by showing that the development of liquidity credit stocks has not been cyclical (Step 1). In fact, easier credit access coincides with dramatic increases in local per capita short-term liquidity credits in some federal states. In Step 2 we pinpoint that tax rate changes are rather rare in all federal states regardless of credit access. We find no cyclical behavior involving tax reductions and tax hikes. Instead, we find a rise in tax rate volatility towards

the end of our time horizon, despite easing credit access. Next, we show graphically that there is a possible positive relationship between tax rate volatility and credit access. This contradicts the notion that credit access might induce less volatile tax rates (Step 3). We suggest spending pressure as a potential explanation. Last, we employ an econometric approach in which we account for spending pressure (Step 4). However, the empirical results also suggest a positive link, which would point to an improper use of local debt. Hence, we cannot reject the positive relationship between credit access and tax rate volatility.

It therefore appears that whether federal states allow their municipalities access to debt or not has no impact on the stability of their tax rate choices. Local tax rates are not less volatile, and instead tend to be more volatile, in federal states which grant their municipalities ample access to debt. While local tax rates in Germany are generally rather stable over time, this still gives cause for concern. Further research will be required to validate this conclusion. If it is confirmed, important implications follow. If the major theoretical justification for public debt for consumption expenditures crumbles in practice, there is a case for more credit rationing, at least at the local level. Otherwise calls for bailouts become more and more likely. In Germany, federal states with loose attitudes towards local debt should then follow the example of states that never expanded local credit access in the first place. Making such a change would necessarily require revisiting local spending responsibilities and the adequacy of state transfers to the local level. Ensuring effective monitoring and budgetary oversight is also crucial.

Beyond Germany, the findings of this paper suggest that higher-level governments should think twice before allowing subnational governments, and local governments in particular, access to credit to fund current expenditures. Chances are local debt will not be used in a welfare enhancing way.

4.5 Appendix

Table 4.9: Wording of current liquidity credit paragraph

Federal states	Current wording
Baden-Württemberg	§ 89 GemO (1) The municipality has to ensure timely settlements of expenses. (2) To ensure timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. The authorization continues to hold until the budget by-law for the following year is passed. (3) The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one fifth of the profit and loss budget's ordinary expenses.
Bavaria	Art. 73 GO (1) To ensure timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. (2) The ceiling set in the budget by-law shall not exceed one fifth of the cash-flow budget's revenues for current administrative activities and one sixth of the administrative budget's revenues, respectively, for the core budget, and one sixth of the profit plan's revenues for owner-operated municipal enterprises.
Brandenburg	§ 76 BbgKVerf (1) The municipality has to ensure solvency through appropriate liquidity planning at all times. (2) For the timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set by the municipal council. The decision on the liquidity credit ceiling is to be reported to the regulatory authority immediately.
Hesse	§ 105 HGO (1) For the timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. This authorization holds beyond the current budget year until the announcement of the new budget by-law. (2) The ceiling set in the budget by-law requires approval by the regulatory authority.
Lower Saxony	§ 122 NKomVG (1) For the timely settlement of expenses, the municipalities may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. This authorization holds beyond the current budget year until the entry into force of the new budget by-law. Sentence 2 also holds for a new ceiling set in the new budget by-law before its entry into force, provided it does not exceed the amount specified in paragraph 2. (2) The ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one sixth of the cash-flow budget's revenues for current administrative activities.

Federal states	Current wording
Mecklenburg-Vorpommern	§ 53 KV M-V (1) The municipality has to ensure solvency at all times. (2) For the timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law and approved according to paragraph 3, provided no other funds are available. This authorization holds beyond the current budget year until the public announcement of the new budget by-law. (3) The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds ten percent of the cash-flow budget's current revenues for administrative activites.
North Rhine-Westphalia	§ 89 GO NRW (1) The municipality has to ensure solvency through appropriate liquidity planning at all times. (2) For the timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. This authorization holds beyond the current budget year until the promulgation of the new budget by-law.
Rhineland-Palatinate	§ 105 GemO (1) The municipality has to ensure solvency at all times. (2) For the timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. This authorization holds beyond the current budget year until the public announcement of the new budget by-law. (3) § 49 does not apply to the take-up of liquidity credits.
Saarland	§ 94 KSVG (1) For the timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. This authorization holds beyond the current budget year until the announcement of the new budget by-law. (2) If, given the budget reorganization plan, it is apparent that a balanced budget is not possible in the foreseeable future, the municipality may take out liquidity credits with maturities beyond the budget year, provided this is economically necessary.
Saxony	§ 84 SächsGemO (1) The municipality has to ensure timely settlements of expenses. (2) For the timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. The authorization continues to hold until the budget by-law for the following year is passed. (3) The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one fifth of the profit and loss budget's ordinary expenses.
Saxony-Anhalt	§ 110 KVG LSA (1) For the timely settlement of expenses, the municipality may take out credits up to the ceiling set in the budget by-law, provided no other funds are available. The authorization continues to hold until the budget by-law for the following year is passed. (2) The liquidity credit ceiling set in the budget by-law requires approval by the regulatory authority if it exceeds one fifth of the cash budget's revenues for current administrative activities.

Federal states	Current wording
Schleswig-Holstein	§ 87 GO For the timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. This authorization holds beyond the current budget year until the announcement of the new budget by-law.
Thuringia	§ 65 ThürKO (1) For the timely settlement of expenses, the municipality may take out liquidity credits up to the ceiling set in the budget by-law, provided no other funds are available. This authorization holds beyond the current budget year until the promulgation of the new budget by-law. (2) The ceiling set in the budget by-law requires approval if 1. the ceiling for the core budget exceeds one sixth of the administrative budget's expenses, 2. the ceiling for owner-operated municipal enterprises or municipal institutions exceeds one sixth of the profit plan's revenues.

Source: Local government laws. Translation by authors.

Table 4.10: Circular decrees and official government statements

Federal states	Date	Directive
Brandenburg	24.07.2013	If the budget by-law is passed in violation of the general balanced budget principle, this constitutes an unlawful act that is to be objected by the regulatory authority. The obligation for objection is not applicable if the budget by-law is accompanied by a budget consolidation plan. Budget consolidation plans require approval by the regulatory authority. A consolidation period beyond the financial planning horizon [five years] is usually not approvable. Exceptions are possible if the consolidation plan demonstrates exceptional willingness to consolidate. Municipalities requiring a budget consolidation plan should set property and business tax rates at least equal to the weighted average of tax rates in municipalities of their size range. A reduction of tax rates is not permissible until a structurally balanced budget is reached.
	22.06.2004	Liquidity credits beyond the credit ceiling will be condoned, though not formally approved, for municipalities under provisional budget management if the exceedance is due to irrefutable payment obligations. Budget consolidation plans should aim for the fastest possible restoration of budgetary equilibrium. In justified cases where the municipality demonstrates an exceptional willingness to consolidate, consolidation periods beyond the financial planning horizon may be acceptable.

Federal states	Date	Directive
	23.02.2000	If the budget by-law violates the principle of budgetary equilibrium, the budget is unlawful. In order to avoid objection to this unlawful act, a budget consolidation plan must be passed at the latest in the same session as the budget by-law. The budget consolidation plan must specify the time at which budget equilibrium of the administrative budget will be restored. In case more than one year is required, a maximum deficit must be specified for each year. In the exceptional case that the consolidation period will be longer than the financial planning horizon, financial planning must be carried forward until the point of budget equilibrium. A budget consolidation period beyond the financial planning horizon is usually not approvable. Criteria for an exceptional approval are, amongst others: Property tax rates are set at least equal to the average tax rates of municipalities in their size range.
Hesse	03.03.2014	There are special reporting requirements by regulatory authorities on muncipalities that will only achieve budget equilibrium in 2016, as well as those with liquidity credits beyond 200 euro p.c. The budget of a municipality with permanent deficits cannot be approved if the property tax rate is not at least 10% higher than the average in the respective size range. When raising business tax rates, possible consequences regarding jobs etc. are to be considered. The regulatory authority can therefore refrain from insisting on an adjustment to average tax rates. In case of permanent deficits, business tax rates below the standard tax rate of 310% are not acceptable. In case of rejection of budgets, regulatory authorities must inform municipalities that they are now operating under provisional budget management. They must monitor compliance effectively.
	06.05.2010	Municipalities with permanent deficits must have tax rates, particulary for property taxes, that are markedly above average rates in the respective size range.
	03.08.2005	In case of permanent deficits, tax rates for the property and business tax must be markedly above average rates in the respective size range.
Lower Saxony	21.07.2014	In case of permanent and irrefutable deficits, mid-term financing of the stock of liquidity credits may be justified. Maturities of up to four years may be agreed for this stock of liquidity credits. Municipalities without a deficit in the current budget year may also make use of this arrangement in case they have accumulated past deficits and a corresponding stock of liquidity credits. Municipalities making use of this exceptional arrangement must develop a concept for the medium-term reduction of liquidity credits.

Federal states	Date	Directive
	29.01.2008	In case of permanent deficits and approved liquidity credits, it is justifiable that municipalities take out the irrefutable stock of liquidity credits with a credit period of up to four years if this is more economical. This also applies to municipalities without a deficit in the current budget year if they have an irrefutable stock of liquidity credits due to past deficits.
	24.01.2003	Failure to achieve a balanced budget must be justified towards the regulatory authority, including by a budget consolidation plan. Such budgets are to be regarded as lawful even if they are in deficit.
Mecklenburg-Vorpommern	10.01.2007	Liquidity credit ceilings beyond the approval threshold should only be approved within tight limits and only after submission of a substantive liquidity preview. For municipalities in financial difficulties, further liquidity credits should only be approved within strict limits. Regular reports by the applicant on the prospective development of liquidity credits are required.
North Rhine-Westphalia	16.12.2014	The local government law does not specify maturities for liquidity credits. Municipalities have to agree on maturities of liquidity credits with creditors on their own authority. Municipalities may pass interest agreements for a part of its total stock of liquidity credits according to the following rules: For half of its total stock interest agreements may have maturities of up to ten years. For a further quarter of its total stock interest agreements may have maturities of up to five years. Interest agreements of more than five years require consultation with the competent regulatory authority.
	06.05.2011	The local government law does not specify maturities for liquidity credits. Municipalities have to agree on maturities of liquidity credits with creditors on their own authority. Municipalities may pass interest agreements for a part of its total stock of liquidity credits according to the following rules: For half of its total stock interest agreements may have maturities of up to ten years. For a further quarter of its total stock interest agreements may have maturities of up to five years. Interest agreements of more than five years require consultation with the competent regulatory authority.
	9.10.2006	The local government law does not specify maturities for liquidity credits. Municipalities have to agree on maturities of liquidity credits with creditors on their own authority. Interest agreement may not exceed five years. Interest agreements of more than three and up to five years require consultation with the competent regulatory authority.
	05.01.2006	The current rules for the approval of budget consolidation plans, according to which business and property tax rates should be markedly above average rates in the respective size range, were not intended to trigger an upward spiral of tax rates. In the future, tax rates equal to the average are sufficient. Tax rates may only be lowered when budget equilibrium has been achieved.

Federal states	Date	Directive
	30.08.2004	It is justifiable for municipalities to have a permanent stock of liquidity credits of up to 50% of average yearly liquidity credits.
	04.06.2003	Municipalities without an approved budget consolidation plan have to report the amount of liquidity credits to the regulatory authority quarterly. If the liquidity credits exceed a third of gross revenues in the administrative budget, they have to submit a liquidity plan to the regulatory authority detailing measures to reduce the liquidity credit stock.
Rhineland-Palatinate	26.09.2008	It has been considered acceptable for municipalities with permanent deficits to have a stock of liquidity credits, and to have liquidity credits with maturities of three to four years for the minimum stock. Now it is considered acceptable for regulatory authorities to allow maturities of five years if liquidity credits are needed to ensure solvency in the face of permanent deficits.
Saxony	14.12.2007	If the budget cannot be balanced in the foreseeable future, the rules of provisional budget management apply. Additionally, a budget consolidation plan must be passed specifying the feasible consolidation potentioal.
		The approval of credit ceilings beyond the approval threshold may be subject to conditions.
		Municipalities under provisional budget management may take out liquidity credits to fund permissible expenses. The municipality has to announce the take-out to the municipal council and the regulatory authority two weeks in advance for assessment.
		Liquidity credits must not exceed the ceiling set in the budget by-law at any time.
Schleswig-Holstein	31.03.2006	In case of permanent stocks of liquidity credits, it may be more economical to fund this stock with medium-term as opposed to short-term credits. It is therefore acceptable for municipalities with medium-term permanent deficits to take out liquidity credits with maturities up to the end of the financial programming period if this appears more economical.
Thuringia	09.07.2012	Municipalities operating under a budget consolidation plan must keep daily records of liquidity credits. Such municipalities must levy property and business taxes at at least the weighted average of tax rates in their size range.

Source: Circular decrees and offical government statements. Selective summary and translation by authors.

Table 4.11: Number of municipalities with tax rate changes, 1998-2013

	Property tax				Business tax			
	No change	One change	Two to four changes	Five to eleven changes	No change	One change	Two to four changes	Five to eleven changes
Baden-Württemberg	109	366	540	41	222	571	258	5
Bavaria	842	768	433	7	993	689	363	5
Brandenburg	12	26	18	2	31	18	9	0
Hesse	28	93	268	32	68	148	200	5
Lower Saxony	39	234	662	50	61	269	606	49
Mecklenburg-Vorpommern	128	236	206	4	196	218	147	13
North Rhine-Westphalia	0	18	296	82	4	55	312	25
Rhineland-Palatinate	53	230	1907	82	314	980	968	10
Saarland	5	22	21	3	1	3	41	6
Saxony	14	55	185	36	56	87	136	11
Saxony-Anhalt	17	20	83	41	26	21	69	45
Schleswig-Holstein	126	265	572	107	151	383	507	29
Thuringia	69	445	256	6	55	447	268	6
Total	1442	2778	5447	493	2178	3889	3884	209

Notes: Number of municipalities with tax rate changes calculated for the balanced panel of 10,160 municipalities for the period 1998 to 2013. See Table 4.12 for details on the panel structure of the unbalanced original panel.

Source: Own calculations based on data from the Regional Database Germany, Statistics Local and state statistical offices.

Table 4.12: Panel structure by state

Federal states	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	N in all years
Baden-Württemberg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.0	0.0	1.8	0.6	1.0	96.0	17600
Bavaria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	32896
Brandenburg	2.1	0.2	13.2	9.7	23.2	1.3	0.7	0.6	2.7	5.6	7.6	2.9	1.1	3.5	16.5	9.1	10425
Hesse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.4	99.1	6797
Lower Saxony	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.1	96.8	16304
Mecklenburg-Vorpommern	0.5	0.2	0.4	0.3	0.8	5.0	1.7	0.2	1.7	1.2	4.1	2.7	5.3	3.9	4.5	67.6	13795
North Rhine-Westphalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	6336
Rhineland-Palatinate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	99.8	36887
Saarland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	98.2	831
Saxony	2.9	0.2	0.4	0.2	0.8	0.6	0.3	0.4	0.9	1.7	0.8	1.3	3.7	5.0	24.0	56.8	8173
Saxony-Anhalt	0.0	0.0	0.4	2.0	1.7	3.5	3.3	0.8	1.4	1.2	13.8	53.5	0.2	0.0	0.2	17.9	14537
Schleswig-Holstein	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.5	0.4	0.0	0.0	0.0	0.8	97.9	17966
Thuringia	0.3	0.1	0.1	0.3	0.1	0.4	0.1	0.5	1.4	0.7	0.8	0.9	2.8	3.9	3.3	84.3	15566
Total	0.3	0.0	0.8	0.7	1.5	0.7	0.4	0.2	0.5	0.7	1.8	4.4	1.1	1.0	2.7	83.0	198113

Notes: Panel structure of unbalanced panel by federal state. The table shows the share of municipalities of each federal state present in the dataset in 1, 2,..., 16 years.

Table 4.13: Number of observations by state

Federal state	N
Baden-Württemberg	1056
Bavaria	2050
Brandenburg	58
Hesse	421
Lower Saxony	985
Mecklenburg-Vorpommern	574
North Rhine-Westphalia	396
Rhineland-Palatinate	2272
Saarland	51
Saxony	290
Saxony-Anhalt	161
Schleswig-Holstein	1070
Thuringia	776
Total	10160

Notes: Number of observation by state for the balanced panel.

Table 4.14: Components of credit access index by state and year, 1998-2013

Components	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Baden-Württemberg															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.1	0	0	0	0	0	0	0	.	0	0	0	0	.	.	0	0
3.2	.	.	.	.	.	.	.	1	.	.	.	.	1	1	.	.
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Bavaria															
1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.1	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.
3.2	.	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Brandenburg															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.
1.3	.	.	.	.	.	.	.	.	.	.	2	2	2	2	2	2
2	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
3.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Hesse															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
1.2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.3	.	2	2	2	2	2	2	2	2	2	2	2	2	2	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Components	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
3.2	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
	Lower Saxony															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1
3.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Mecklenburg-Vorpommern															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.1	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.2	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	North Rhine-Westphalia															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	.	.	.	.	.	.	.5	.5	1	1	1	1	1	1	1	1
3.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.2	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.
3.3	.	.	.	.	.	.	.	2	2	2	2	2	2	2	2	2
4	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1
	Rhineland-Palatinate															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Components	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1.3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1
3.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.2	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.
3.3	.	.	.	.	.	.	.	.	.	2	2	2	2	2	2	2
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Saarland															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.
1.3	.	.	.	.	.	.	.	.	.	2	2	2	2	2	2	2
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.2	1	1	1	.	.	.	.	.	.	.	1	.	.	.	.	.
3.3	.	.	.	2	2	2	2	2	2	2	.	2	2	2	2	2
4	.	.	.	.	1	1	1	1	1	1	1	1	1	1	1	1
	Saxony															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.1	.	.	0	0	.	.	.	.	.	.	0	0	0	0	0	0
3.2	1	1	.	.	1	1	1	1	1	1	.	.	.	.	.	.
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Saxony-Anhalt															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.
1.3	.	.	.	.	.	.	2	2	2	2	2	2	2	2	2	2
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.2	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Components	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Schleswig-Holstein															
1.1	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.
1.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.3	.	.	.	.	.	.	.	.	.	2	2	2	2	2	2	2
2	.	.	.	.	.	.	.	.	1	1	1	1	1	1	1	1
3.1	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.
3.2	.	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Thuringia															
1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.1	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.2	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Notes: Component 1.1 equals 0 if the local government law contains an unconditional approval clause or an upper limit for liquidity credit ceilings and missing (.) otherwise. Component 1.2 equals 1 if the local government law contains a conditional approval clause for liquidity credit ceilings and missing (.) otherwise. Component 1.3 equals 2 if the local government law contains no approval clause for liquidity credit ceilings and missing (.) otherwise. Component 2 amounts to up to 1 point if circular decrees are in force which expand credit access beyond what is suggested by the letter of the law and missing (.) otherwise. Component 3.1 equals 0 if the aggregate stock of municipal liquidity credits per person is below the 15th percentile (14,8 euros per person) of all territorial states and missing (.) otherwise. Component 3.2 equals 1 if the aggregate stock of municipal liquidity credits per person is above the 15th percentile and below 85th percentile (544 euros per person) of all territorial states and missing (.) otherwise. Component 3.3 equals 2 if the aggregate stock of municipal liquidity credits per person is above the 85th percentile of all territorial states and missing (.) otherwise. Component 4 equals 1 point if more than one third of municipalities have a liquidity credit stock of more than 544 euros per person and missing (.) otherwise.

Table 4.15: Summary statistics by state, main variables

Federal state	Statistics	Number of changes			Mean of credit access index	Funding need growth
		PT	BT	BT and PT		
Baden-Württemberg	Mean	1.87	1.11	2.98	1.19	37.76
	Std. Dev.	1.28	0.85	1.86	0.00	65.17
	Min.	0.00	0.00	0.00	1.19	-154.83
	Max.	7.00	7.00	14.00	1.19	975.61
	N	1056	1056	1056	1056	1056
Bavaria	Mean	0.89	0.75	1.64	0.88	-2.82
	Std. Dev.	0.96	0.90	1.64	0.00	58.45
	Min.	0.00	0.00	0.00	0.88	-342.33
	Max.	6.00	7.00	9.00	0.88	725.78
	N	2050	2050	2050	2050	2050.
Brandenburg	Mean	1.47	0.72	2.19	2.88	30.52
	Std. Dev.	1.27	1.01	1.91	0.00	61.63
	Min.	0.00	0.00	0.00	2.88	-203.07
	Max.	5.00	4.00	8.00	2.88	238.79
	N	58	58	58	58	58
Hesse	Mean	2.38	1.59	3.96	3.00	46.86
	Std. Dev.	1.39	1.14	2.09	0.00	58.42
	Min.	0.00	0.00	0.00	3.00	-172.70
	Max.	7.00	7.00	12.00	3.00	374.00
	N	421	421	421	421	421
Lower	Mean	2.32	2.12	4.45	2.38	48.50
Saxony	Std. Dev.	1.30	1.26	2.31	0.00	87.57
	Min.	0.00	0.00	0.00	2.38	-376.93
	Max.	8.00	7.00	15.00	2.38	972.60
	N	985	985	985	985	985
Mecklenburg-	Mean	1.32	1.15	2.47	1.88	53.34
Vorpommern	Std. Dev.	1.08	1.20	2.01	0.00	131.11
	Min.	0.00	0.00	0.00	1.88	-642.64
	Max.	7.00	7.00	13.00	1.88	989.75
	N	574	574	574	574	574
North Rhine-	Mean	3.39	2.62	6.01	4.38	48.56
Westphalia	Std. Dev.	1.43	1.20	2.36	0.00	40.97
	Min.	1.00	0.00	1.00	4.38	-22.56
	Max.	9.00	8.00	17.00	4.38	365.52
	N	396	396	396	396	396
Rhineland-	Mean	2.54	1.44	3.98	3.81	58.89
Palatinate	Std. Dev.	1.07	0.94	1.69	0.00	126.53
	Min.	0.00	0.00	0.00	3.81	-891.83
	Max.	8.00	6.00	13.00	3.81	910.74
	N	2272	2272	2272	2272	2272
Saarland	Mean	1.78	3.04	4.82	3.94	92.00

Federal state	Statistics	Number of changes			Mean of credit access index	Funding need growth
		PT	BT	BT and PT		
	Std. Dev.	1.40	1.25	2.15	0.00	103.72
	Min.	0.00	0.00	1.00	3.94	-44.75
	Max.	7.00	6.00	10.00	3.94	431.03
	N	51	51	51	51	51
Saxony	Mean	2.67	1.77	4.44	1.50	42.71
	Std. Dev.	1.58	1.48	2.66	0.00	97.39
	Min.	0.00	0.00	0.00	1.50	-85.44
	Max.	11.00	8.00	18.00	1.50	940.92
	N	290	290	290	290	290
Saxony-	Mean	3.33	3.20	6.53	2.56	81.02
Anhalt	Std. Dev.	2.28	2.58	4.50	0.00	126.54
	Min.	0.00	0.00	0.00	2.56	-441.45
	Max.	10.00	11.00	21.00	2.56	833.36
	N	161	161	161	161	161
Schleswig-	Mean	2.23	1.73	3.96	2.19	84.59
Holstein	Std. Dev.	1.59	1.25	2.64	0.00	166.22
	Min.	0.00	0.00	0.00	2.19	-984.52
	Max.	7.00	6.00	12.00	2.19	999.78
	N	1070	1070	1070	1070	1070
Thuringia	Mean	1.37	1.43	2.80	1.88	31.94
	Std. Dev.	0.86	0.90	1.61	0.00	201.72
	Min.	0.00	0.00	0.00	1.88	-837.95
	Max.	6.00	6.00	12.00	1.88	974.03
	N	776	776	776	776	776
Total	Mean	1.96	1.44	3.40	2.28	42.56
	Std. Dev.	1.41	1.21	2.37	1.14	118.14
	Min.	0.00	0.00	0.00	0.88	-984.52
	Max.	11.00	11.00	21.00	4.38	999.78
	N	10160	10160	10160	10160	10160

Notes: Cross section derived from balanced panel of 10,160 municipalities for the period 1998 to 2013. Index of credit access corresponds to the mean over the 16-year horizon. Funding need growth (in %) is defined as the growth in funding need between 1998 and 2006. The number of property tax (PT) and business tax (BT) changes and funding need growth are municipal-level variables while the index of credit access is a state-level variable.

Source: Own calculations based on data from the Regional Database Germany, Statistics Local, the FDZ and state statistical offices. Credit access index by authors.

Table 4.16: Summary statistics by state, control variables

Federal State	Statistics	Mun. assoc. status	Population	Employees	Private income	GDP	Left
Baden-	Mean	1.00	9941.35	0.24	19056.92	27137.46	0.01
Württemberg	Std. Dev.	0.00	26404.72	0.14	986.72	4070.35	0.07
	Min.	1.00	170.00	0.01	16761.07	20654.13	0.00
	Max.	1.00	594457.69	1.09	26845.67	56478.33	0.62
	N	1056	1056	1056	1056	1056	1056
Bavaria	Mean	1.00	6056.91	0.21	18251.39	24723.27	0.01
	Std. Dev.	0.00	32065.60	0.16	1817.73	8300.74	0.06
	Min.	1.00	232.19	0.01	15518.73	16508.47	0.00
	Max.	1.00	1.29e+06	1.84	28235.13	79894.07	0.31
	N	2050	2050	2050	2050	2050	2050
Brandenburg	Mean	0.66	11501.12	0.24	15216.02	18248.92	1.00
	Std. Dev.	0.48	12811.81	0.15	810.17	2770.97	0.00
	Min.	0.00	537.81	0.01	13775.47	14436.60	1.00
	Max.	1.00	65117.38	0.63	16822.00	28046.27	1.00
	N	58	58	58	58	58	58
Hesse	Mean	1.00	14326.22	0.22	18176.74	25212.67	0.23
	Std. Dev.	0.00	37715.47	0.14	1730.46	5724.32	0.29
	Min.	1.00	679.06	0.05	16015.93	19299.13	0.00
	Max.	1.00	660622.06	1.40	25293.80	74934.33	1.00
	N	421	421	421	421	421	421
Lower	Mean	0.28	7359.12	0.17	17011.27	20883.16	0.31
Saxony	Std. Dev.	0.45	15905.72	0.13	1203.93	4417.90	0.18
	Min.	0.00	314.19	0.01	14966.60	14517.80	0.00
	Max.	1.00	246477.81	0.91	20986.87	76327.27	1.00
	N	985	985	985	985	985	985
Mecklenburg-	Mean	0.06	2577.40	0.19	14014.18	15932.03	0.59
Vorpommern	Std. Dev.	0.24	10718.81	0.15	525.94	1596.47	0.36
	Min.	0.00	124.25	0.00	13055.43	14123.58	0.19
	Max.	1.00	201322.19	1.00	14893.60	28901.20	1.00
	N	574	574	568	574	574	574
North Rhine-	Mean	1.00	45292.18	0.26	18702.23	24064.24	0.34
Westphalia	Std. Dev.	0.00	87117.45	0.09	1593.17	4446.20	0.36
	Min.	1.00	4220.19	0.06	15109.40	16622.87	0.00
	Max.	1.00	987816.88	0.61	23023.87	64717.87	1.00
	N	396	396	396	396	396	396
Rhineland-	Mean	0.02	1767.11	0.13	17485.10	20209.04	0.74
Palatinate	Std. Dev.	0.14	7597.48	0.16	921.43	3447.34	0.33
	Min.	0.00	8.00	0.00	15634.53	12548.73	0.00
	Max.	1.00	192906.06	1.94	20931.13	57722.07	1.00
	N	2272	2272	2180	2272	2272	2272
Saarland	Mean	1.00	16901.06	0.24	17579.70	24651.89	0.12

Federal State	Statistics	Mun. assoc. status	Population	Employees	Private income	GDP	Left
	Std. Dev.	0.00	9953.28	0.15	2324.96	5017.17	0.19
	Min.	1.00	6407.94	0.04	15263.53	19034.07	0.00
	Max.	1.00	49003.63	0.67	22502.47	32668.40	0.47
	N	51	51	51	51	51	51
Saxony	Mean	0.50	10106.45	0.25	14796.39	6944.61	0.00
	Std. Dev.	0.50	43911.73	0.12	441.15	1219.15	0.00
	Min.	0.00	412.00	0.05	14070.50	6119.70	0.00
	Max.	1.00	504054.63	0.82	15741.33	22167.83	0.00
	N	290	290	290	290	290	290
Saxony-	Mean	0.44	7338.16	0.25	16130.09	20045.84	0.25
Anhalt	Std. Dev.	0.50	9589.40	0.15	518.85	2565.91	0.00
	Min.	0.00	569.19	0.03	15363.67	16259.33	0.25
	Max.	1.00	47484.38	0.91	17041.50	25971.17	0.25
	N	161	161	161	161	161	161
Schleswig-	Mean	0.07	2555.09	0.14	17514.71	21918.22	0.37
Holstein	Std. Dev.	0.26	11275.65	0.27	1213.23	3420.02	0.06
	Min.	0.00	6.25	0.00	15145.67	15213.33	0.36
	Max.	1.00	236321.94	7.70	21071.07	35782.73	1.00
	N	1070	1070	1060	1070	1070	1070
Thuringia	Mean	0.11	2658.63	0.20	14595.69	17020.85	0.03
	Std. Dev.	0.32	10355.50	0.21	481.05	1465.65	0.10
	Min.	0.00	42.38	0.00	13462.27	15074.00	0.00
	Max.	1.00	202767.94	2.18	16703.47	28488.20	0.67
	N	776	776	755	776	776	776
Total	Mean	0.47	6895.98	0.19	17308.89	21587.73	0.31
	Std. Dev.	0.50	28791.31	0.18	1890.88	6345.32	0.36
	Min.	0.00	6.25	0.00	13055.43	6119.70	0.00
	Max.	1.00	1.29e+06	7.70	28235.13	79894.07	1.00
	N	10160	10160	10031	10160	10160	10160

Notes: Cross section derived from balanced panel of 10,160 municipalities for the period 1998 to 2013. All variables correspond to the mean over the 16-year horizon. Municipal association status, population, employees (p.c.) are municipal-level variables, GDP, private income (both in euro p.c.) and left majority at state elections are county-level variables.
Source: Own calculations based on data from the Regional Database Germany, Statistics Local, the Federal Employment Agency and state statistical offices.

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