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Does expenditure composition influence the debt level? Evidence from German federal states

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Non-technical summary

In spite of extensive inter-state revenue equalization and homogeneous budget rules, fiscal performance is increasingly diverging across the German *Länder*. While tax autonomy is largely limited, state and local governments are endowed with considerable expenditure autonomy and are free to borrow within certain limits. The paper therefore addresses the question of whether the budget structure – i.e. the allocation of public expenditure by categories – has an influence on the degree of indebtedness of the *Länder*. Hence, the focus of this work is on the long-term nexus between expenditure composition and sub-national government debt levels, while most other studies draw on cross-country comparisons and investigate whether certain types of fiscal consolidation reduce public debt more permanently than others.

Since financial resources are largely predetermined, state and local governments must primarily rely on the expenditure side to adjust budget deficits. Within this context, the literature on endogenous growth shows that both the level and composition of government expenditure (and taxation) has an impact on economic growth. Sub-national governments could generate regional economic growth and employment by increasing the provision of productive public goods. This, in turn, would partly lead to higher tax revenues and lower social transfers, in the end reducing indebtedness.

The panel analysis primarily draws on 10 West German states during the 1974-2010 period. Differences in the budget structure appear to be moderate and barely changed over time, except for investment expenditure and spending on social services and transport. The debt-to-GDP ratio is regressed on the composition of state and local government expenditure, while controlling for a separate level effect of total expenditure and, alternatively, socio-economic and political factors, as well as for fixed time and state effects. The results indicate that diverging socio-economic conditions have a determining impact on the degree of indebtedness. As expected, higher government consumption in proportion to investment has a debt-augmenting effect, though, considered separately, larger shares of investment as well as personnel expenditure are associated with lower debt. Particularly states spending more on transport and communication, and law and order are less indebted, while social services have a detrimental effect. However, these results partly prove to be not robust when adding the East German states and Berlin after unification.

More generally, our results are consistent with the view that strongly centralized revenue in conjunction with decentralized spending conflicts with sustainable sub-national government finances in Germany, given that hitherto existing budget rules are too soft and a federal bailout exists. Re-shaping of the expenditure composition proves to have a limited influence. In that respect, one can argue that our findings – against the background of the new stricter debt rules, too – support a reform of the tax sharing and equalization system, including larger tax autonomy of the federal states.

Nicht-technische Zusammenfassung

Trotz eines umfassenden Finanzausgleichs und homogener Haushaltsregeln, klafft die Lage der öffentlichen Finanzen der Bundesländer immer stärker auseinander. Während die Steuerautonomie der Länder und Gemeinden äußerst begrenzt ist, verfügen diese über eine beträchtliche Ausgabenautonomie und können sich innerhalb bestimmter Grenzen frei verschulden. Das Papier beschäftigt sich aus diesem Grunde mit der Frage, ob die Budgetstruktur - die Verteilung der Staatsausgaben nach Kategorien - einen Einfluss auf den Verschuldungsgrad der Bundesländer hat. Damit steht der langfristige Zusammenhang zwischen Ausgabenstruktur und Schuldenhöhe der dezentralen Gebietskörperschaften im Zentrum dieser Arbeit, während die meisten anderen Studien auf internationale Ländervergleiche abstellen und untersuchen, ob bestimmte Formen der Konsolidierung die Staatsschulden nachhaltiger senken als andere.

Da die Finanzausstattungen großenteils vorgegeben sind, müssen die Länder- und Gemeindehaushalte hauptsächlich auf der Ausgabenseite ansetzen, um ihre Defizite anzupassen. Im Zusammenhang damit zeigt die Literatur zum endogenen Wachstum, dass sowohl die Höhe als auch die Zusammensetzung der staatlichen Ausgaben (und Steuern) das Wirtschaftswachstum beeinflussen. Durch eine vermehrte Bereitstellung produktiver öffentlicher Güter könnten dezentrale Gebietskörperschaften Wachstum und Beschäftigung auf regionaler Ebene generieren. Dies dürfte wiederum zu teilweise höheren Steuereinnahmen und niedrigeren Sozialtransfers und damit letztlich zu einem Rückgang der Schulden führen.

Die Panelanalyse zieht primär 10 westdeutsche Länder im Zeitraum 1974-2010 heran. Die Unterschiede in der Budgetstruktur scheinen eher moderat und änderten sich kaum über die Zeit, mit Ausnahme der Investitionsausgaben und der Aufwendungen für Sozialleistungen und Verkehr. Die Schuldenquote der Länder- und Gemeindehaushalte wird auf deren Ausgabenstruktur regressiert, während gleichzeitig für einen separaten Niveaueffekt der Gesamtausgaben und alternativ für sozio-ökonomische und politische Faktoren, sowie für feste Zeit- und Ländereffekte kontrolliert wird. Die Ergebnisse belegen, dass stark divergierende sozio-ökonomische Gegebenheiten einen bestimmenden Einfluss auf den Verschuldungsgrad haben. Wie erwartet hat ein größeres Verhältnis von staatlichen Konsum- zu Investitionsausgaben einen schuldenerhöhenden Effekt, wenngleich bei getrennter Betrachtung sowohl höhere Investitions- als auch Personalausgabenquoten mit niedrigeren Schulden einhergehen. Insbesondere Länder, die relativ mehr für Verkehr und Nachrichtenwesen sowie für öffentliche Ordnung und Rechtsschutz ausgeben, sind in geringerem Maße verschuldet, während die Sozialausgaben erwartungsgemäß einen nachteiligen Einfluss haben. Diese Ergebnisse erweisen sich allerdings bei Einbeziehung der ostdeutschen Ländern und Berlins nach der Vereinigung als teilweise nicht robust.

Allgemeiner betrachtet stehen unsere Ergebnisse im Einklang mit der Vorstellung, dass in Deutschland stark zentralisierte Einnahmen im Zusammenhang mit dezentralisierten Ausgabenkompetenzen im Widerspruch zu soliden Länder- und Gemeindefi-

nanzen stehen. Dies ist nicht zuletzt auf die bislang existierenden weichen Haushaltsregeln und den Bailout durch den Bundesstaat zurückzuführen. Umschichtungen in der Ausgabenstruktur scheinen einen begrenzten Einfluss zu haben. In diesem Sinne kann man argumentieren, dass unsere Ergebnisse hier – auch vor dem Hintergrund der neuen strengeren Schuldenregeln – für eine Reform des Steuerverbunds und des Finanzausgleichs unter Einbeziehung einer größeren Steuerautonomie für die Bundesländer sprechen.

BUNDESBANK DISCUSSION PAPER NO 52/2013

Does expenditure composition influence the debt level? Evidence from German federal states*

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Abstract

Despite strongly equalized per capita revenue and similar budgetary institutions, fiscal performance is increasingly diverging across German federal states. Given that state and local governments are endowed with expenditure autonomy, this paper investigates whether the composition of sub-national government expenditure has an impact on the degree of indebtedness. A panel analysis for the 1974-2010 period indicates that aside from socio-economic and political factors, the budget structure plays an important role. As expected, a higher ratio of government consumption to investment has a debt-augmenting effect, though, considered separately, larger budget shares of both investment and personnel expenditure are associated with lower debt. Particularly states spending more on transport and communication, and law and order are less indebted, while social spending has a detrimental effect on debt levels.

Keywords: public debt, expenditure composition, sub-national government, German states

JEL classification: H72, H74, H77.

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1 Introduction

The debt of sub-national governments has steadily risen in Germany during the last four decades. Yet the development was not uniform, with fiscal performance increasingly diverging across the federal states (*Länder*). This is quite surprising, given that state governments lack real tax raising autonomy and per capita revenues are strongly equalized through inter-governmental transfers. Moreover, part of state legislation is federally mandated, and budgetary institutions – including debt rules – are harmonized. At the same time, however, state and local governments are endowed with considerable spending autonomy and are free to borrow within certain limits. Therefore, the question arises whether the budget structure in terms of the allocation of expenditure by categories has an influence on the degree of indebtedness of sub-national governments.

Since financial resources are largely predetermined and tax autonomy is limited, state and local governments must primarily rely on the expenditure side to adjust budget deficits. Within this context, the budget structure could affect the soundness of public finances by influencing the economic performance. As shown by the literature on fiscal policy and endogenous growth (Barro 1990, Kneller et al 1999, or Devarajan et al 1996), both the level and composition of government expenditure (and taxation) has an impact on economic and productivity growth. Sub-national governments could boost regional economic growth and employment particularly by increasing investment expenditure or, more specifically, the provision of productive public goods. This, in turn, would partly lead to higher tax revenues and lower social transfers.

This paper investigates the effect of both the level and composition of state and local government expenditure on the debt-to-GDP ratio, while controlling for fixed time and, in some cases, state effects. The analysis primarily draws on a panel of 10 West German states during the 1974-2010 period, which is then extended to all German states after unification. Given the sluggishness of the debt stock and budgetary components, we refrain from specifying a dynamic panel model. Nonetheless, the fixed effects approach accounts for the influence of time varying factors within the states. Potential endogeneity is addressed in different ways. Since the debt level and the budget structure might be determined simultaneously by omitted variables, we include socio-economic and political variables which are assumed to have an effect on both of them. Concerns arising from reverse causation in the short run, i.e. the debt level determining expenditure composition, are dealt with by performing robustness tests with instrumental variables and first differences.

The results indicate that state-specific socio-economic and political factors had a decisive impact on the degree of indebtedness of the German states over time. Expenditure composition played an important role, too. Higher government consumption in proportion to investment has an expected debt-augmenting effect, though, considered separately, larger shares of both investment and personnel expenditure are associated with lower debt. Particularly states spending more on transport and communication, and law and order are less indebted, while social services have a detrimental effect on

debt levels. The results partly change when adding the East German states and Berlin after unification. However, certain reverse causation could not be entirely dismissed.

These findings only partly contrast with the related large literature which has dealt with the political and economic determinants of budget deficits across countries (e.g. Roubini and Sachs, 1989), and the implications of the budget structure, in particular. Alesina and Perotti (1995, 1997), and McDermott and Wescott (1996) find that fiscal adjustment which primarily relies on cutting social transfers and government employment and wages reduces public deficits and debt more successfully than tax increases and cuts in public investment. This is mostly explained by the persistent effect of certain fiscal adjustments on the sustainability of debt dynamics. However, these cross-country studies compare consolidated general governments with unlimited spending and revenue raising powers. Intra-country analyses have received instead less attention and generally neglect the budget structure. This is also the case for the most related work of Jochimsen and Nuscheler (2011), Galli and Rossi (2002), and Seitz (2000) which focuses on the political determinants of the government finances of West German states.

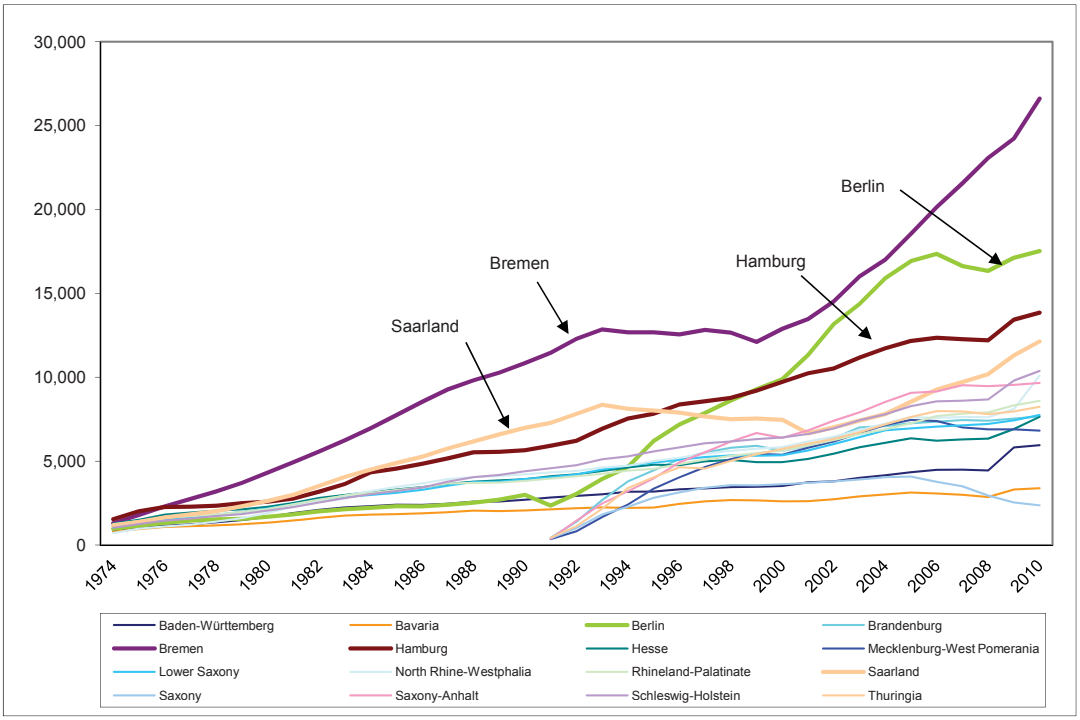
The main contribution of the present paper consists in analyzing in detail the budget structure and its impact on the sub-national government debt levels in the context of the German federal system and for a long period of time. Thereby, the compositional and level effects of public expenditure are separated. Unlike the literature, the focus is more general on the possible long-term nexus between expenditure composition, economic performance and debt levels. Accordingly, aspects of strict causality are not dealt with either. To begin with, the development of the states' debt levels is confronted with the socio-economic and financial conditions and trends in expenditure composition for the purpose of detecting possible interrelations. In section 3 the implications of the budget structure for the debt level are discussed against the background of the literature. The empirical analysis is conducted in section 4 and the last section draws the conclusions.

2 Fiscal performance of the German federal states

2.1 Diverging trends in sub-national government debt

The analysis of the sub-national government finances in Germany has to take into account that the 16 *Länder* are fundamentally distinct in terms of size, financial status and history. The three city states of Berlin, Bremen and Hamburg consist of only one municipality and enjoy privileged treatment within the financial equalization system. The five East German states which joined the federation in 1990 and the unified city of Berlin underwent significant economic transition processes and still display certain distinctive features. In the following, state and local government budgets are consolidated in order to make the figures for non-city and city states (where the state budgets also cover local government functions) comparable overall. In this way, we also control for the state-specific allocation of competencies and resources between state and local governments.

Figure 1: Debt of state and local governments, 1974-2010 (€ per inhabitant)



Note: Capital market debt, core budgets, in current prices. Berlin: until 1990 West-Berlin. Source: Federal Statistical Office, own calculations.

The debt of German state and local governments has increased on aggregate almost steadily since the mid-1970s, rising from 11% of GDP in 1974 to 26% of GDP in 2010.[1] Growth of debt in per capita terms was even more impressive (from around € 900 to € 8,000 per inhabitant). However, debt levels and dynamics turn out to differ considerably across the states. The degree of indebtedness varies widely even among the eight West German non-city states and differences increased considerably, in particular between the beginning of the 1980s and the 1990s (see Figure 1 and Table 1, as well as Figure 2 and Table 8 in the Appendix for corresponding GDP shares).[2] Debt growth was generally higher in the city states, in particular in Bremen, which currently represents the most indebted federal state. The general decoupling of the debt dynamics in

[1] Public debt is defined here as capital market debt, excluding cash credits. The latter prevail at the local government level and expanded considerably during the last ten years. Since extra-budgetary entities are not systematically reported in government finance statistics for such a long period of time, the analysis broadly relies on the core budgets. Due to statistical revisions, the period of analysis ends in 2010.

[2] In order to limit the influence of exceptional alterations in single years due to the economic cycle, statistical revisions or other specific events, comparisons in the tables are drawn on three-year averages.

Bremen, Saarland, and to a lesser degree in Hamburg, from the rest of the West German federal states mostly started at the end of the 1970s, whereas in the case of Berlin the significant increase resulted just after unification and cessation of the special funding of West Berlin. Federal bailout transfers during the 1994-2004 period dampened the deterioration in Bremen and Saarland only temporarily. East German states also strongly incurred debts in the first few years after unification, yet starting from very low levels. An exception is Saxony, which after a steady reduction currently has the lowest debt per capita among all federal states.

2.2 Socio-economic and financial conditions

This large and increasing divergence in the degree of indebtedness of the German federal states might be induced by different socio-economic and financial conditions. On the one hand, the *Länder* differ quite substantially in terms of income levels as well as social and economic structures (see Table 7 in the Appendix). Yet, these differences become less pronounced if the three groups of states are considered separately. Economic disparity is relatively moderate within the (reference) group the West German non-city states, though it increased over time due to the significant spread in growth and employment records. On the other hand, all *Länder* ultimately reach almost equal financial resources and similar levels of public services. This is mainly due to the requirement to establish equal living conditions anchored in the Basic Law. Significant differences in original fiscal capacities are equalized to a large extent through vertical and horizontal inter-governmental transfers and state governments mostly lack own tax-raising powers, as most important taxes are legislated uniformly and the revenues are shared with the federal and local levels of government.[3] As a consequence, no inter-state fiscal competition takes place. Aside from this, the federal government and the social security provide for extensive macroeconomic stabilization, containment of regional shocks and inter-state income redistribution. And, finally, the political, judiciary and budgetary institutions – not least the budget rules – of the states are almost identical.

At the same time, even if federal framework legislation largely harmonizes the provision of public services across states, state and local governments are endowed with considerable expenditure autonomy. The scope for borrowing is quite large, too, as state governments are allowed to freely issue new debt up to the amount of investment expenditure, and even beyond in exceptional circumstances. The budget rules of local governments are stricter and imply direct supervision by the state governments.

Budget figures indeed prove a high degree of financial homogeneity within the three groups of *Länder*. However, even after horizontal equalization, per capita tax revenue still varies across West German non-city states – though to a lesser extent as compared to the income levels (see Table 1). This indicates persistent state-specific economic structures which determine tax-raising capacities. The variation of total revenue (after ad-

[3]For a description of the German federal financial system see: Federal Ministry of Finance (2010).

ditional federal grants) and particularly total expenditure per inhabitant is even lower. Against this background of similar institutional and financial conditions, the divergent fiscal performance of the federal states seems quite surprising. The moderate differences in revenue and expenditure levels are likely to explain the strongly diverging debt dynamics only to some extent, given that debt levels varied considerably already at the beginning of the period under investigation and developments in certain states were quite unusual.

2.3 Composition of government expenditure

Given that state and local governments have considerable scope to allocate public expenditure, a scrutiny of the budget structure in terms of the composition of government expenditure by categories might provide further insights into the causes underlying these debt developments. West German non-city states currently spend an average of 38% of their budgets on personnel, 15% on other operating expenditure, and about 7% on real investment and interest payments, respectively (see Table 2).[4] Since the latter are reversely determined by the debt level, they are not further taken into account here. The share of spending on personnel and real investment in particular declined steadily in all West German states since the mid-1970s, whereas for other operating expenditure a slight upward trend is reported.[5]

An important share of the expenditure falls into functional categories, which are determined largely autonomously and are quite personnel-intensive (see Table 3): 20% is spent on education (primary to tertiary, vocational), just over 9% on general public services (general government, tax and other administration), and 8% on law and public order and security. Social welfare services, which are mostly provided by local governments yet determined by federal legislation, also play an important role with a share of 19% in total expenditure. Only 6% of the budget is allocated to the investment-intensive area of transport and communication. During the last four decades the share of social services in particular grew significantly in all West German states. Only marginal increases can be observed for general public services and law and order and some decreases for education and transport and communication.

All in all, state and local government expenditure seems to vary to a larger extent in terms of composition as compared to total size, with inter-state differences increasing over time in certain areas. This concerns real investment in particular, and other operating expenditure to a lesser degree, while in terms of government functions the budget shares of social services and transport and communication tend to increasingly vary.

[4] For the important category of current transfers to households and enterprises, data were not available in sufficient detail for the entire period.

[5] Note that the figures mostly include core budgets. Therefore, outsourcing of budgetary entities might seriously distort comparisons between states in single years.

Table 1: Debt, total expenditure and revenue of state and local governments (€ per inhabitant)

State	Public debt		Total expenditure		Total revenue		Tax revenue	
	1974-76	2008-10	1974-76	2008-10	1974-76	2008-10	1974-76	2008-10
Baden-Württemberg	1,002	5,403	1,829	4,627	1,681	4,567	1,054	3,388
Bavaria	942	3,184	1,675	5,128	1,565	4,913	938	3,537
Hesse	1,532	6,965	1,917	5,326	1,672	4,878	1,065	3,672
Lower Saxony	1,275	7,469	1,707	4,366	1,496	4,158	865	2,937
North Rhine-Westphalia	932	8,609	1,693	4,663	1,506	4,381	1,030	3,175
Rhineland-Palatinate	1,436	8,273	1,717	4,606	1,527	4,084	881	2,911
Saarland	1,396	11,203	1,606	4,744	1,356	3,813	821	2,836
Schleswig-Holstein	1,242	9,618	1,720	4,445	1,528	4,097	878	2,905
West German non-city								
Mean	*1,220*	*7,590*	*1,733*	*4,738*	*1,541*	*4,361*	*941*	*3,170*
VC (%)	*18.0*	*30.6*	*5.2*	*6.5*	*6.3*	*8.5*	*9.5*	*9.6*
Berlin	1,146	16,995	3,173	6,276	2,975	6,116	776	3,003
Bremen	1,800	24,635	2,439	6,504	1,974	5,244	1,247	3,264
Hamburg	1,939	13,162	2,479	6,127	2,273	5,825	1,604	4,747
City states								
Mean	*1,628*	*18,264*	*2,697*	*6,302*	*2,407*	*5,729*	*1,209*	*3,671*
VC (%)	*21.3*	*26.1*	*12.5*	*2.5*	*17.4*	*6.3*	*28.0*	*20.9*
Brandenburg		7,536		5,045		5,001		2,640
Meckl.-West Pomerania		6,872		5,025		5,215		2,550
Saxony		2,617		4,855		5,032		2,662
Saxony-Anhalt		9,558		5,059		5,092		2,595
Thuringia		8,003		4,897		4,848		2,577
East German states								
Mean		*6,917*		*4,976*		*5,038*		*2,605*
VC (%)		*33.6*		*1.7*		*2.4*		*1.6*
All states	1,135	7,393	1,796	4,801	1,615	4,584	992	3,185
VC (%)	*23.9*	*55.3*	*23.6*	*12.3*	*25.4*	*12.6*	*22.3*	*17.7*

Notes: Three-year averages. Mean: unweighted (except for: All states); VC: unweighted coefficient of variation. Source: Federal Statistical Office, own calculations.

Table 2: Composition of state and local government expenditure (by economic type)

State	Personnel		Other operating		Real invest.		Interest	
	1974-76	2008-10	1974-76	2008-10	1974-76	2008-10	1974-76	2008-10
Baden-Württemberg	41.4	40.8	13.3	14.7	20.3	9.8	3.5	4.2
Bavaria	41.7	37.3	12.8	14.0	19.3	11.2	3.4	2.6
Hesse	41.5	35.2	13.3	15.4	17.5	8.1	5.0	5.8
Lower Saxony	42.8	38.5	12.7	15.2	17.3	6.5	5.0	7.4
North Rhine-Westphalia	40.0	36.8	12.7	17.5	17.7	4.0	3.6	7.4
Rhineland-Palatinate	40.8	39.2	13.8	16.7	17.5	6.4	5.9	8.1
Saarland	45.9	38.0	13.8	12.9	15.5	5.2	6.2	11.2
Schleswig-Holstein	43.5	36.5	11.7	13.9	15.4	7.5	4.7	8.5
West German non-city								
Mean	*42.2*	*37.8*	*13.0*	*15.0*	*17.6*	*7.3*	*4.7*	*6.9*
VC (%)	*4.1*	*4.3*	*4.9*	*9.6*	*8.9*	*29.7*	*21.5*	*36.6*
Berlin	44.3	33.6	17.0	23.8	8.0	2.2	2.5	10.4
Bremen	43.4	31.1	14.3	14.8	19.7	2.0	5.0	14.5
Hamburg	47.4	31.3	14.5	21.5	11.4	4.8	4.9	8.7
City states								
Mean	*45.0*	*32.0*	*15.3*	*20.0*	*13.0*	*3.0*	*4.2*	*11.2*
VC (%)	*3.8*	*3.6*	*8.0*	*19.0*	*37.6*	*42.8*	*28.0*	*21.7*
Brandenburg		29.3		13.9		7.3		7.0
Meckl.-West Pomerania		29.7		13.6		8.5		5.9
Saxony		29.7		13.4		11.6		2.9
Saxony-Anhalt		31.5		15.9		7.6		8.4
Thuringia		31.4		14.2		9.8		6.9
East German states								
Mean		*30.3*		*14.2*		*9.0*		*6.2*
VC (%)		*3.1*		*6.3*		*17.4*		*29.8*
All states	42.2	36.8	13.4	16.2	17.5	7.6	4.1	6.4
VC (%)	*5.0*	*10.9*	*9.6*	*18.5*	*21.5*	*39.6*	*23.7*	*39.2*

Notes: Three-year averages. Expenditure by economic type as % of total expenditure. Mean: unweighted (except for: All states); VC: unweighted coefficient of variation. Source: Federal Statistical Office, own calculations.

Table 3: Composition of state and local government expenditure (by government function)

State	Gen. publ. services		Law & order		Education		Transp. & commun.		Social services	
	1974-76	2008-10	1974-76	2008-10	1974-76	2008-10	1974-76	2008-10	1974-76	2008-10
Baden-Württemberg	7.5	8.3	5.3	6.6	20.8	22.5	7.4	6.1	12.2	14.2
Bavaria	7.6	7.5	6.2	6.8	21.5	20.1	8.0	6.0	11.5	14.9
Hesse	7.9	9.4	6.2	8.3	19.8	19.1	7.3	5.9	13.1	19.7
Lower Saxony	8.0	8.3	6.1	8.5	22.9	21.0	6.5	5.7	13.3	21.2
North Rhine-Westphalia	8.3	10.5	6.5	8.4	23.3	20.0	6.4	4.8	16.2	22.2
Rhineland-Palatinate	8.7	10.3	5.9	8.2	18.7	20.0	7.4	7.5	15.8	19.4
Saarland	10.0	10.6	6.7	7.9	23.5	17.6	6.3	4.3	12.0	18.3
Schleswig-Holstein	8.3	10.1	6.8	8.1	20.6	18.1	6.7	5.6	12.9	22.2
West German non-city										
Mean	*8.3*	*9.4*	*6.2*	*7.9*	*21.4*	*19.8*	*7.0*	*5.8*	*13.4*	*19.0*
VC (%)	*9.1*	*11.9*	*7.1*	*8.9*	*7.6*	*7.3*	*8.1*	*15.2*	*12.1*	*15.1*
Berlin	6.9	5.8	8.5	10.4	16.5	18.4	3.0	3.8	20.6	25.8
Bremen	7.4	6.6	7.6	7.7	19.1	16.6	3.6	2.1	13.7	22.8
Hamburg	6.0	9.1	8.5	9.1	19.5	19.1	6.8	4.9	14.1	21.8
City states										
Mean	*6.7*	*7.2*	*8.2*	*9.1*	*18.4*	*18.1*	*4.5*	*3.6*	*16.1*	*23.5*
VC (%)	*8.8*	*19.5*	*5.0*	*12.2*	*7.3*	*5.9*	*37.6*	*32.0*	*19.5*	*7.2*
Brandenburg		12.4		9.2		13.5		7.8		24.0
Meckl.-West Pomerania		9.9		9.4		16.6		6.8		24.8
Saxony		9.1		9.7		19.0		7.5		22.8
Saxony-Anhalt		9.0		9.0		17.1		5.9		24.5
Thuringia		9.3		8.3		19.0		7.2		23.1
East German states										
Mean		*9.9*		*9.1*		*17.0*		*7.0*		*23.8*
VC (%)		*12.7*		*5.1*		*12.0*		*9.0*		*3.2*
All states	7.9	9.2	6.5	8.3	21.5	20.0	6.8	5.9	14.3	20.4
VC (%)	*12.5*	*17.1*	*14.6*	*11.3*	*10.0*	*10.9*	*23.9*	*25.4*	*17.5*	*15.0*

Notes: Three-year averages. Expenditure by government function as % of total expenditure. Mean: unweighted (except for: All states); VC: unweighted coefficient of variation. Source: Federal Statistical Office, own calculations.

3 Relation between budget structure and public debt

The descriptive analysis raises the question whether the increasing divergence in fiscal performance of the German federal states is linked – apart from socio-economic conditions – to differences in expenditure composition. Due to strong fiscal equalization and limited tax autonomy, sub-national financial resources are largely predetermined. State and local governments therefore have to primarily rely on the expenditure side to adjust the budget. Within this context, the budget structure could ultimately affect the overall soundness of the public finances through its impact on the economic performance. The literature on fiscal policy and endogenous growth (Barro 1990, Kneller et al 1999, or Devarajan et al 1996) generally shows that both the level and composition of government expenditure (and taxation) has an impact on economic and productivity growth.[6] A growth-enhancing influence is mostly found for government investment in general, and expenditure on general public services (including public order and safety), education, and transport and communication in particular. By contrast, distortive taxes as well as government consumption in general, and more specifically, social services and spending related to leisure and economic activities tend to have a negative impact. In accordance with this, sub-national governments could boost regional economic growth and employment by allocating larger portions of their budgets to investment, and respectively, productive expenditure. This, in turn, would lead to higher tax revenues, given that revenues are not entirely equalized across states (as shown above), part of local tax yields also being exempted from redistribution. At the same time, social transfers would drop, with both effects ultimately leading to lower deficits and debt levels.

Nonetheless, reverse causation, i.e. the debt level determining expenditure composition, is plausible, too, at least in the short run. Highly indebted governments might be forced to cut certain expenditure, provided that budget rules credibly limit the scope for new borrowing or capital markets exert a disciplining effect. Investment, other operating expenditure, and within certain limits spending on personnel, are more likely to be reduced in the short run, instead of social transfers which are mostly derived from legal entitlements under federal legislation. However, some objections could be raised against such reverse causation. First, the budget structure is more likely to influence the debt level in the long run through the link described above than vice versa. And second, in the context of the German federal system the degree of indebtedness imposes rather soft constraints on the size and composition of sub-national government spending. This is due to the fiscal equalization system, which provides insurance against regional revenue shocks, as well as to the potential bailout by the federation in the event of budgetary hardship of state governments (with similar mechanisms provided by the state level for the local governments). The implied bailout is proven by the previous special transfers for Bremen and Saarland[7] and almost equal funding conditions for all state

[6] See, also, Barro (1991), Aschauer (1989), or Easterly and Rebelo (1993), as well as Colombier (2011) for similar evidence for Switzerland.

[7] However, more recently, the Constitutional Court rejected a similar claim from the state of Berlin,

and local governments on the capital markets. Moreover, the investment-based budget rules are often circumvented in practice and lack effective supervision and sanctioning.

The general reference material for investigating the possible influence of the budget structure on the debt level is the literature which deals with the composition of fiscal adjustments and budget performance. Alesina and Perotti (1995, 1997) and McDermott and Wescott (1996) investigate this relationship during periods of fiscal consolidation, showing that it is the composition of spending cuts much more than their size that determines how permanent fiscal adjustments are and which macroeconomic effects ensue. Cross-country studies find evidence that fiscal consolidation which primarily relies on cutting social transfers and government employment and wages, while keeping taxes constant is more successful in terms of permanently reducing public deficits and curtailing debt growth, as well as inducing expansionary effects on the economy. By contrast, tax increases and cuts in public investment fail to permanently stabilize debt growth.[8] In a multivariate approach, Heylen and Everaert (2000) mostly confirm these results, yet they reject the consolidating effect of cuts in the wage bill. Köhler-Töglhofer and Zagler (2007), who dealt with the compositional effect of fiscal policy on debt dynamics more generally at all times, find instead that cuts in public investment and tax increases tend to reduce the debt levels.

These cross-country studies compare consolidated general governments with (virtually) unlimited spending and revenue raising powers. Therefore, they might be less suitable for explaining debt dynamics at sub-national government levels, not least in the context of the German federal system. Aside from this, this literature focuses on the role of the budget structure for the credibility of the future fiscal stance, while the possible general relation with the economic and fiscal performance exposed above is not addressed directly. Similar analyses for sub-national governments have received less attention so far. Jochimsen and Nuscheler (2011), Galli and Rossi (2002), and Seitz (2000) investigate the political determinants of West German state government deficits and debt, without referring to the expenditure composition. They find evidence for a deficit-augmenting effect of coalition governments and some mixed results for electoral cycles. For the main part, public spending and deficits seem to be driven by common economic developments and differences in the economic performance.[9] Stehn and Fedelino (2009), and Rodden (2006) prove that stronger reliance on equalizing transfers does indeed weaken the fiscal discipline of net-recipient German states and lead to pro-cyclical behavior.

indicating that the state government first has to exhaust all potential own budgetary means before it can receive a bailout.

[8] See also Alesina and Ardagna (1998, 2012).

[9] Berger and Holler (2007) also show that common, and to a lesser extent, state-specific economic developments influence overall state government spending and revenue, while Schneider (2010) detects weak electoral cycles in state government expenditure and Potrafke (2011) provides evidence for an effect of government ideology on the allocation of educational and cultural state government expenditure. Similar studies on the determinants of fiscal discipline of Swiss cantons (Schaltegger and Torgler 2007, Schaltegger and Feld 2009) focus on the role of referendums and also neglect the budget structure.

4 Empirical analysis

4.1 Data and method

Against the background of the descriptive analysis and the theoretical discussion, we address empirically the question of whether expenditure composition has an effect on the degree of indebtedness of German state and local governments. Unlike the existing literature, we do not focus on the impact of fiscal policy on the sustainability of debt dynamics during particular fiscal adjustment periods, but, more generally, on the possible long-term nexus between the budget structure of sub-national government expenditure and the debt level.

On the one hand, any empirical analysis for the German federal states covering a longer period of time encounters several difficulties. First, due to the small cross-section and the fundamental differences between city and non-city states, as well as between West and East German states the statistical degrees of freedom are quite reduced and results are very sensitive to outlying developments in single states or to the size of the sample. Second, there are large structural breaks in the course of time due to German unification (which also affects the city state of Berlin) and revisions of the statistical delimitation of the public sector. On the other hand, homogeneous institutional and financial conditions, as well as strongly correlated regional business cycles limit the influence of different institutions, fiscal capacities, and asymmetric regional shocks.

In order to cover a longer time period and avoid structural breaks, the panel analysis first includes only the ten West German states excluding Berlin (due to unification and its special status previously) during the 1974-2010 period. This corresponds to the approach used in previous studies for Germany, too.[10] However, as distinguished from those studies, state and local government levels are consolidated for the reasons of comparability between city and non-city states mentioned at the beginning. Even though local authorities enjoy a large degree of budgetary autonomy, it seems reasonable to treat state and local governments as an economic unit when investigating the economic and fiscal determinants of indebtedness. State governments exert a significant insurance and bailout function and considerably interact with the local government budgets. Moreover, local tax revenue are partly included in inter-state revenue equalization. A second analysis involves all 16 states during the 1995-2010 period, after unification and the integration of the East German states and Berlin into the fiscal equalization system.

The following separable functional form relates the stock of state and local government debt (as % of nominal state GDP)[11] in state i and year t to the level ($ExpLevel_{it}$)

[10] Jochimsen and Nuscheler (2011), and Seitz (2000) investigate 10 West German states during the 1960-2005 and 1976-1996 period, respectively, while Galli and Rossi (2002) also include West Berlin for the period 1974-1994.

[11] As in Seitz (2000) and Galli and Rossi (2002), debt is set in relation to GDP of each state, since the alternative specification per inhabitant causes stronger non-stationarity. Even though the regionalized measurement of GDP is affected by certain methodological problems, these might only slightly affect

and structure ($ExpStruct_{it}$) of government expenditure:

$$Debt_{it} = [\beta_{0i}] + \beta_{1t} + \beta_2 \cdot ExpLevel_{it} + [\beta_3 \cdot SocEcon_{it}] + \beta_4 \cdot ExpStruct_{it} + \epsilon_{it},$$

The total expenditure-to-GDP-ratio is used to control for a general level effect. Section 2.2 reveals substantial inter-state differences in socio-economic structures which might have an impact on public debt, as well as on the level and structure of expenditure. Accordingly, state-specific socio-economic and political variables ($SocEcon_{it}$) are employed alternatively to the expenditure level: population size, real per capita income (state GDP, in constant prices of 2000), unemployment rate, and an indicator for the political orientation of the state government (share of left-wing parties in total seats of the government coalition in the legislature). These factors are likely to determine the costs of public services and to represent different preferences for public goods and debt financing. For example, due to economies of scale, larger states generally encounter lower administrative costs per capita. Also, higher income levels are positively related to tax revenues and the demand for public services. By including the unemployment rate we control for both structural economic problems and temporary budgetary effects related to the business cycles. Finally, according to the partisan theory, one would expect politicians to decide according to the preferences of the voters who support them, left-wing governments being commonly assumed to favor an expansionary fiscal policy and debt financing. However, the empirical evidence is rather inconclusive.

Following the classification in section 2.3, the budget structure is represented in terms of expenditure by economic type, and, alternatively, government functions in relation to total expenditure. We refrain from using per capita or GDP ratios in order to better separate level and composition effects and limit the influence of trends. Structural developments might then be represented more adequately. This broadly corresponds to the approach used by Devarajan et al (1996) for growth regressions. We distinguish in economic terms between government consumption and investment, with the former including here personnel and other operating expenditure, and the latter only real investment. Aside from considering the budget shares of these three expenditure categories individually, government consumption on aggregate is set alternatively in relation to investment. As for the functional classification, based on the literature we consider expenditure on general public services, law and order, education, transport and communication to be rather productive (in terms of economic inputs), and social services to be less productive. Yet we refrain from aggregating productive expenditure categories, including them individually in the regressions instead. Note, again, that state and local governments enjoy a considerable degree of autonomy on those productive expenditure categories, whereas social services are mostly determined by uniform federal legislation. Altogether, both economic and functional expenditure categories considered here represent on average 60% of consolidated state and local government budgets. So-

direct inter-state comparisons and should have no influence on the regressions.

cial, economic, and budgetary annual data are drawn from the Federal Statistical Office, political data from additional sources (www.election.de).

Time-specific constants β_{1t} (fixed time effects) are used in all regressions to represent common debt effects. These may arise from the national business cycle or economic shocks (e.g. oil crises), German unification, federal wage agreements in the public sector, statistical revisions (e.g. exclusion of entities from the public sector), or any changes in federal institutions or legislation (e.g. new equalization system, debt rules). We refrain from specifying a dynamic panel model with an auto-regressive process where the lagged dependent variable is included, too. This is mostly used in related literature in order to identify dynamic processes. However, given the sluggishness of both public debt and expenditure composition, the debt stock in a certain period would almost entirely be determined by its level in the previous period, while the actually underlying factors would lose their explanatory power. Finally, country-specific constants β_{0i} (fixed state effects) are included in an alternative specification to control for the unobserved heterogeneity of the states. This involves state inherent characteristics which barely change over time, including factors which are difficult to observe or quantify (e.g. culture, preferences, certain enduring social or economic structures).

In a first step, pooled OLS regressions (with fixed time effects) are carried out. In order to take the heterogeneity of the states into account, robust standard errors adjusted for within-group clustering are calculated (clustered sandwich estimator, see White, 1980).[12] A time-constant dummy variable for the three city states (Berlin, Bremen, Hamburg) and another one for the five East German states in the larger sample are included to control for the structural distinctiveness of these states. In a second step, the fixed (within-groups) effects approach (including fixed time effects and robust standard errors, too) is used, where all states are treated individually without differentiating between groups of states. Following other studies for Germany, a period dummy is now inserted to take into account distinct debt developments in Saarland and Bremen during the period 1994-2004 where these states received bailout transfers to alleviate budgetary hardship. Whereas the pooled regressions primarily deal with the factors explaining variation across states at repeated points in time, the fixed effects approach focuses on the impact of time varying factors within the states. However, while solving the omitted variable bias encountered in pooled regressions, the fixed effects model, on the other hand, makes it difficult to analyse factors which barely change over time.

4.2 Results

4.2.1 West German states 1974-2010

The results of the pooled OLS regressions for the 10 West German states during 1974-2010 are reported in Table 4. Specification tests indicate that all coefficients are jointly

[12] However, note that this method leads to less precise estimates, the reliability of the variance matrix estimator being questionable in the case of small cross-sections.

significant and the R^2 is generally very high. Variables which were mostly insignificant and did not contribute to improving the model were dropped in view of the small statistical degree of freedom and negative implications for the computation of robust clustered standard errors. Collinearity of the budget components is mostly dismissed by corresponding tests. The results confirm in general that year effects are relevant, i.e. that the fiscal stance is affected by common federal developments.

The assumed negative effect of the budget share of investment on the debt ratio is confirmed in all specifications at a high level of significance (columns 1, 3). Surprisingly, however, in contrast to what would have been expected from the literature, a similar significant debt-reducing effect is also found for personnel expenditure, and other operating expenditure plays no role. This means that a larger share of consumptive spending does not per se involve a weak fiscal stance; the areas where these sums are spent are decisive, too. For example, despite the highest ratio of personnel expenditure, Baden-Württemberg is currently among the least indebted states. Nonetheless, when those expenditure categories are combined, it turns out that indeed higher government consumption in proportion to investment is associated with more debt (column 4).

The implications in terms of government functions are less clear, though mostly in line with the predictions (columns 2, 5). A higher share of social services raises the debt level, whereas expenditure on transport and communication and, to a lesser extent, on law and order have a debt-reducing effect. In contrast to the findings of cross-country studies, general public services and education seem to have no relevance. In case of general public services, however, when distinguishing between general and tax administration, the first presents a significant debt-increasing effect (alternative regressions not shown here). As for education, the insignificant results could be due to the fact that human capital building is a long-term process with significant lags. Aside from this, perfect mobility of qualified labour in the national context generally leads to inter-jurisdictional fiscal spillovers. Since public education is mostly free of charge in Germany, the incidence of benefits and cost of education differs, the states spending more on education not necessarily reaping the corresponding future benefits in terms of higher economic growth and tax revenues. These spillovers are only partly offset by the financial equalization system. Indeed, tests separating total education expenditure show that the budget share of school education turns out to be clearly related to lower debt ratios, while spending on universities remains insignificant.

The results for the budget structure in terms of government functions match those in terms of economic type only in the case of the transfer-dominated social services and for transport and communication, where real investment plays an important role. in contrast to this, the personnel-intensive government functions considered here do not display corresponding debt-reducing effects. Moreover, as partly demonstrated above, the less significant results could be due to the aggregation of heterogeneous functional sub-categories (representing different public goods) or the omission of other relevant government functions. A stronger disaggregation might be useful here, yet a simultaneous analysis would be unfeasible in view of the small cross-section.

Table 4: Determinants of public debt, 10 West German states, 1974-2010

Variable	Pooled OLS					Fixed effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Population			-0.42***	-0.49***	-0.55***			-3.39**	-5.05***	-6.50***
			(0.10)	(0.08)	(0.12)			(1.26)	(1.03)	(1.30)
Real GDP p.c.			-1.53***	-0.99***	-0.96***			-0.96**	-0.50**	-1.15**
			(0.19)	(0.18)	(0.20)			(0.37)	(0.21)	(0.47)
Unemployment			1.00***	1.72***	1.60***			1.03***	1.52**	1.34**
			(0.32)	(0.37)	(0.42)			(0.27)	(0.53)	(0.48)
Left-wing government			0.02***	0.02				0.03***	0.02	
			(0.01)	(0.01)				(0.01)	(0.01)	
Total expend. (% GDP)	3.23***	2.96***				1.32**	1.25			
	(0.33)	(0.47)				(0.54)	(0.93)			
Personnel	-0.85***		-1.24***			-0.91***		-0.92***		
	(0.22)		(0.17)			(0.29)		(0.19)		
Other operating	-0.51		-0.01			-0.01		0.18		
	(0.58)		(0.36)			(0.34)		(0.22)		
Real investment	-1.48***		-0.83***			-1.59**		-1.18**		
	(0.26)		(0.13)			(0.59)		(0.44)		
Consumpt. / Invest.				1.09***					0.79***	
				(0.18)					(0.18)	
General publ. services		1.76			0.08		-0.97			-0.99
		(1.37)			(1.01)		(1.28)			(0.87)
Law & order		-2.16			-3.10***		-3.59			-3.86**
		(1.23)			(0.64)		(2.20)			(1.49)
Education		-0.07					0.06			
		(0.35)					(0.36)			
Transp. & communic.		-1.03**			-1.31***		0.44			-0.36
		(0.47)			(0.34)		(0.87)			(0.56)
Social services		1.21**			0.88***		1.30			0.07
		(0.54)			(0.24)		(0.77)			(0.28)
R^2	0.84	0.80	0.91	0.88	0.90	0.73	0.67	0.85	0.82	0.82
Nobs	370	370	370	370	370	370	370	370	370	370

Notes: All regressions include fixed year effects, the OLS pooled model a dummy for city states, and the fixed effects model a dummy for Bremen and Saarland during the bailout period (coefficients not reported). White/Huber robust standard errors adjusted for within-group clustering in parentheses. ***, **, and * indicate significance at 1%, 5% and 10% levels. R^2: adjusted (OLS), within (fixed effects).

Table 5: Determinants of public debt, 16 German states, 1995-2010

Variable	Pooled OLS					Fixed effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Population			-0.52***	-0.74***	-0.55***			-1.90	-2.21	-3.81
			(0.15)	(0.23)	(0.16)			(8.06)	(6.95)	(5.84)
Real GDP p.c.			-0.93***	-0.56**	-1.04***			-2.77**	-1.90*	-2.44**
			(0.25)	(0.25)	(0.25)			(1.19)	(1.05)	(1.01)
Unemployment			1.23**	1.49**	1.26**			1.21***	0.94***	1.40***
			(0.53)	(0.56)	(0.50)			(0.25)	(0.23)	(0.35)
Left-wing government			0.04*	0.05**	0.05**			0.04*	0.02	0.03**
			(0.02)	(0.02)	(0.02)			(0.02)	(0.02)	(0.01)
Total expend. (% GDP)	1.64***	1.76***				0.02	-0.59*			
	(0.27)	(0.27)				(0.36)	(0.33)			
Personnel	0.71		0.12			0.36		-0.47		
	(0.48)		(0.28)			(0.28)		(0.32)		
Other operating	-1.38*		-0.55			0.38		-0.07		
	(0.77)		(0.65)			(0.41)		(0.33)		
Real investment	-2.51***		-1.05**			-0.63		-0.20		
	(0.30)		(0.50)			(0.71)		(0.58)		
Consumpt. / Invest.				0.62***					0.72***	
				(0.20)					(0.20)	
General publ. services		0.62			0.51		-0.68			-1.21
		(1.37)			(1.21)		(0.72)			(0.70)
Law & order		-0.94			-2.24**		0.87			-1.35
		(1.41)			(0.94)		(2.72)			(1.11)
Education		-1.24*			-0.73*		-1.01**			-0.64
		(0.66)			(0.42)		(0.45)			(0.46)
Transp. & communic.		-1.93*			-1.67***		-2.50*			-1.34***
		(1.14)			(0.44)		(1.24)			(0.47)
Social services		1.10**			0.24		-1.09***			0.18
		(0.43)			(0.39)		(0.36)			(0.24)
R^2	0.75	0.70	0.83	0.83	0.85	0.37	0.50	0.68	0.74	0.74
Nobs	256	256	256	256	256	256	256	256	256	256

Notes: All regressions include fixed year effects, the OLS pooled model dummies for city and East German states, and the fixed effects model a dummy for Bremen and Saarland during the bailout period (coefficients not reported). White/Huber robust standard errors adjusted for within-group clustering in parentheses. ***, **, and * indicate significance at 1%, 5% and 10% levels. R^2: adjusted (OLS), within (fixed effects).

As for the control variables, they have the expected effects and are highly significant, generally supporting the findings of related studies. City states are found to be more heavily indebted in general. The level of total expenditure has a debt-increasing effect.[13] States with a larger population and higher per capita income have lower debt-to-GDP ratios, while higher unemployment has the opposite effect. The dominance of center-left parties in state governments is associated with higher debt levels, too, partly supporting the results of Galli and Rossi (2002). In contrast to this, most previous studies find that government ideology on aggregate plays no systematic role in the German states, attributing this mainly to the lack of real fiscal autonomy for the state governments and the convergence of the political programmes of the two main parties. However, differences could also result from the fact that our study examines the influence of state government parties on consolidated state and local government budgets.[14] Alternative control variables such as population density, the share of trade in GDP as a measure of economic openness, the sectoral economic distribution of employment, state elections and government fragmentation proved mostly insignificant (not reported here). However, these variables are mostly insignificant. Due to high potential endogeneity vis-à-vis the debt level, fiscal equalizing grants received were not considered here.

According to these results, the budget structure plays an important role in explaining divergent degrees of indebtedness of the West German federal states. Yet the influence of economic, social and political conditions seems to prevail. Next we apply the fixed effects approach. The F-Test for model specification points to significant state effects and a Hausman test rejects the alternative use of random effects. The bailout dummy for Saarland and Bremen has the expected negative though only weakly significant sign, indicating that debt dynamics were lower in these two states during this period. The results of the pooled OLS regressions are mostly supported with regard to the control variables and expenditure composition by economic types. As exemplified by the states of Bremen and Saarland, a decline in population size is shown to increase the debt level. The debt reducing effects of larger budget shares of personnel and investment expenditure, as well as the opposite effect of the ratio of consumption to investment are confirmed, too (columns 6, 8, 9). On the other hand, expenditure by government functions now becomes largely insignificant. Only law and order partly maintains a negative effect on debt, while transport and communication, as well as social services, no longer play a significant role. A possible explanation might be that the fixed state effects tend to superpose the influence of the functional budget structure, which displays a slightly stronger persistence as compared to expenditure by economic types. Note, also, that due to the small cross-section it is difficult to address the unobserved heterogeneity in

[13] Note that, when including socio-economic variables and total expenditure simultaneously, the latter becomes insignificant and looses its explanatory power (not reported here). This endorses the separate treatment of these two types of control variables, which partly feature strong collinearity.

[14] In view of the small statistical degree of freedom, the left government and education variables were excluded in the specifications (5) and (10), since they barely contributed to the goodness of fit of the regressions.

an adequate way. And, finally, city and non-city states cannot be systematically distinguished from each other. Therefore, the fixed effects approach seems less convincing here, though it provides some additional evidence from the dynamic perspective.

4.2.2 All German states 1995-2010

The validity of the results for the West German states is tested for all 16 German states during the 1995 to 2010 period (see Table 5). In addition to the city states, distinctive common features of East German states are now taken into account, too. Both pooled and fixed effects regressions generally confirm the previous results with respect to the control variables. The only exceptions are the insignificant effect of population size and the unclear negative effect of total expenditure in the fixed effects model. During this period the positive debt bias of the city states – now including Berlin – becomes weaker, while, as expected, East German states are less indebted on average, since they started with lower debt levels.

As for the budget structure, the previous findings are only partly supported, and some results are difficult to interpret. The positive relation between the ratio of government consumption to investment and the debt level is clearly confirmed, while considered separately, the debt-reducing effect of investment remains significant only in the pooled regressions and personnel expenditure is no longer relevant. A negative though only weakly significant effect is found instead for other operating expenditure. In terms of government functions, strong support is found for the debt-reducing effect of transport and communication in both pooled and fixed effects regressions, and to a lesser extent for expenditure on law and order. Interestingly, higher education expenditure now turns out to be related to lower debt levels, too. The pooled regressions provide only weak evidence that social spending increases the debt level, while the sign is partly reversed in the presence of fixed state effects.

All in all, it is not surprising that the results for the two very different samples partly diverge. First, in view of the small cross-section, the analysis is very sensitive to the addition of the six new states, which differ considerably from the old states in terms of economic and budgetary structures. And second, a considerably shorter period of time is considered. Nonetheless, some evidence remains surprisingly robust.

4.3 Robustness tests

Different tests are carried out to check the robustness of the results, drawing on the sample of 10 West German states. In a first step, we test for the influence of alternative specifications of the variables and the time period chosen.[15] Excluding interest payments and representing the budget structure in terms of primary expenditure shares generally provides similar results. Since social spending is mostly determined by federal legislation, one would assume stronger effects of the other government functions when this

[15]The results of those robustness checks not reported here are available upon request.

category is removed, too. Indeed, particularly the debt-increasing effect of general public services then becomes statistically significant in pooled regressions, while the fixed effects estimates remain mostly insignificant. Next, we limit the analysis to the period 1995-2010. Then, some results change in line with the analysis above for all German states. On the one hand, the ratio of personnel expenditure becomes insignificant in the pooled model, and other operating expenditure has a significant negative sign in some cases. On the other hand, the debt reducing effects of real investment and partly of spending on transport and communication, as well as the positive effect of the ratio of government consumption to investment are mostly confirmed.

A second robustness check replicates the regressions for the entire period of time using the change in the debt level, i.e. the deficit ratio. One would generally expect the conclusions to differ when looking at changes instead of stocks. Indeed, with very few exceptions no significant contemporaneous relationship could be found between expenditure composition and the deficit in the pooled model (see Table 9 in the Appendix). Also, the R^2 is considerably smaller. Particularly when accounting for fixed state effects, an increase in investment ratios significantly raises the deficit and the sign of the ratio of consumption to investment expenditure is reversed, too. This apparent contradiction to previous results might be explained by the fact that, in accordance with state and local budget rules, net borrowing is generally limited to financing public investment. With respect to the functional expenditure classification, significant deficit reducing effects are found for general public services (fixed effects model), and to a lesser extent for transport and communication (pooled model). All in all, the weak statistical evidence for the factors determining changes in the debt level might result from the high persistence of the budget structure and certain control variables.

Finally, we analyze possible concerns relating to a potential spuriousness of the regressions and endogeneity. Problems of non-stationarity and co-movement of long macro-economic series (spurious regressions) are less plausible for the budget structure. However, the results could be seriously distorted if both the debt level and the budget structure are determined simultaneously by omitted factors which are not constant over time and thus not captured by the fixed state effects. This potential endogeneity is taken into account to a certain extent by including socio-economic and political factors which are assumed to influence both the budget structure and the debt level. For unbiased estimates we then have to assume that the budget structure is uncorrelated with the error term. The endogeneity issues discussed in section 3 which are related to the potential reverse causation resulting from the debt level are more problematic. Granger causality tests (not reported here) for individual expenditure categories do indeed seem to confirm a certain reverse causality, the debt level having a negative effect, particularly with respect to real investment. No such reverse causality is found instead for expenditure by government functions. Yet, generally speaking, given the high persistency of the debt level, causality tests with lagged variables are of only limited use. Aside from this, the analysis does not focus on aspects of strict causality, but on the long-term contemporaneous relationship between the budget structure and the debt level.

For a first test of potential endogeneity and reverse causality, we run two-stage least squares instrumental variables (IV) regressions using the pooled model with fixed time effects as above (see columns (1) to (5) in Table 10 in the Appendix). Following the common method in the literature, in the absence of other plausible options the first lags of the expenditure components are used as instruments. The previous results of the standard OLS regressions are confirmed. However, the IV approach has some shortcomings in the present case. By instrumenting one budget component using another, one then has to assume that the budget component used as an instrument is exogenous, i.e. is not itself correlated with the unobserved factors. This seems rather untenable, given the persistent structure of the budget. Therefore the estimators may be biased. Another possibility to address problems arising from both reverse causality and spurious regressions, while at the same time avoiding the critical assumptions of IV estimations, consists in running first difference (FD) estimations (see columns (6) to (10) in Table 10 in the Appendix). This exercise leads for the pooled model[16] to almost entirely insignificant results for the budget structure. Only the debt increasing effect of social expenditure is confirmed. This test has to be treated with caution, too. Due to the high persistence of expenditure composition, year-on-year variation and thus first differences are too small for a reasonable statistical inference.

5 Conclusions

In spite of extensive inter-state revenue equalization, limited tax autonomy and homogeneous budget rules, fiscal performance was increasingly diverging across the German *Länder* during the last four decades. Since state and local governments are endowed with considerable spending autonomy, the paper addresses the question of whether expenditure composition might have an influence on the sub-national debt levels. Following the literature on endogenous growth one would expect larger sub-national budget shares of productive expenditure to generate regional economic growth. This, in turn, would partly lead to higher tax revenues and lower social transfers, in the end reducing the degree of indebtedness.

A descriptive analysis reveals that in spite of spending autonomy, differences in the budget structure are rather moderate across German federal states and barely changed over time, except for investment expenditure and spending on social services and transport and communication. The following panel analysis primarily draws on 10 West German states during the 1974-2010 period. The debt-to-GDP ratio is regressed on the composition of state and local government expenditure, while controlling for a separate level effect of total expenditure and, alternatively, socio-economic and political factors, as well as for fixed time and, in some cases, state effects. Even if a certain reverse causation, i.e. a short-term impact of the debt level on the budget structure, could not be en-

[16] Fixed (within) effects regressions are not considered here, since the coefficients are difficult to interpret when using first differences.

tirely dismissed, some important evidence is provided. First, unobserved state inherent features, diverging socio-economic conditions and, to a lesser extent, government party ideology explain the largest part of the differences in debt levels over time. Second, expenditure composition plays an important, though weaker role, too. As expected, higher government consumption in proportion to investment has a debt-augmenting effect, though, considered separately, larger budget shares of both investment and personnel expenditure are associated with lower debt. Thus, contrary to most findings in the literature, higher personnel expenditure does not per se conflict with a sound fiscal policy. The results support the assumption that states spending more on transport and communication, and law and order are less indebted, while social services have a detrimental effect on the debt levels. These results partly change when adding the East German states and Berlin and considering the shorter period of time after unification.

The main contribution of the present panel analysis consists in investigating in detail the influence of the both compositional and level effects of public expenditure of German sub-national governments on the degree of indebtedness during a long period of time. We also take East German states into account for the first time in this branch of the literature. Some findings partly contrast with the literature on the structure of successful fiscal adjustments, which, however, compares general government budgets across countries. Also, unlike this literature, the focus here is not on the impact of fiscal policy on the sustainability of debt dynamics during periods of adjustment, but, more generally, on the general long-term nexus between expenditure composition and debt levels. The analysis indicates that further disaggregation of the budgets might shed some additional light on this topic. Additional empirical research into the relationship between the budget structure and economic growth at the regional level would be needed, too.

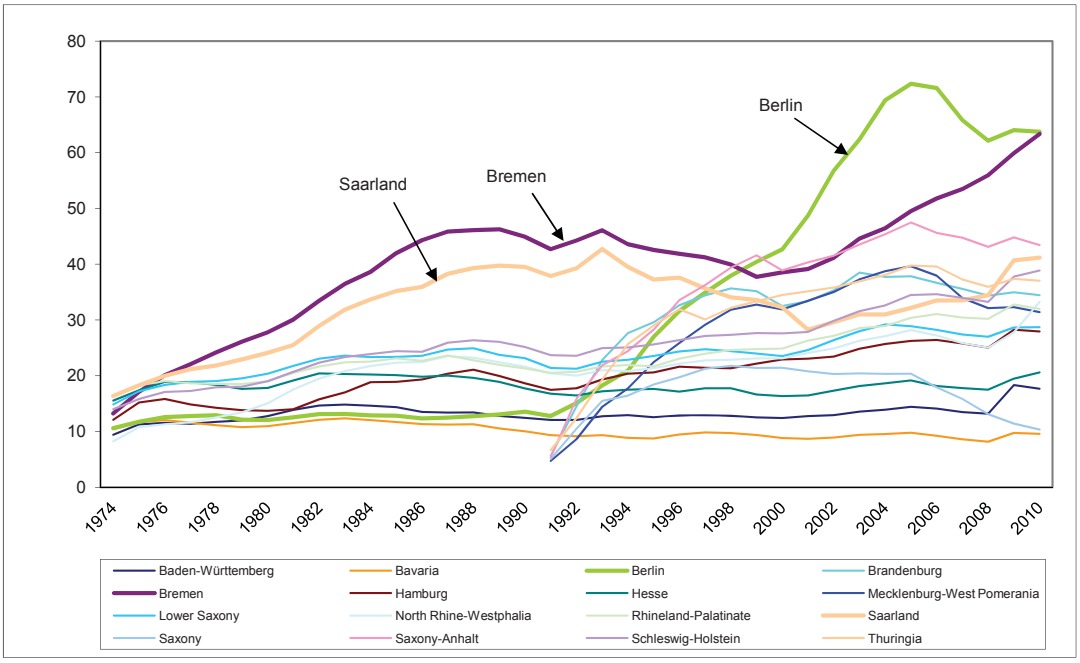
More generally, the results have to be assessed against the specific background of the German federal system. One might conclude that strongly centralized revenue in conjunction with decentralized spending powers conflicts with sustainable sub-national government finances. Hitherto existing investment-based budget rules were too soft to remedy this problem and did not stop the long-term decline in net public assets, either. Aside from this, extensive revenue equalization provides adverse incentives for budgetary discipline. Even temporary bailout transfers proved ineffective and could not invert the deteriorating trend in those federal states. Re-shaping of the expenditure composition proves to have a limited influence. Therefore, given that a disciplining effect of the capital markets is missing due to the implied federal bailout, strict implementation and surveillance (not least by the Stability Council) of the new balanced budget rules with effect from 2020 will be crucial. A concomitant profound reform of the tax sharing and equalization system, including larger state tax-raising autonomy, is needed, too.

A Appendix

Table 6: Summary statistics

Variable	10 states, 1974-2010				16 states, 1995-2010			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
Debt (% GDP)	22.85	9.87	8.18	63.36	29.49	12.47	8.18	72.36
Deficit (% GDP)	1.34	1.13	-1.33	5.62	1.28	1.63	-5.50	7.23
Population (mill.)	6.23	5.19	0.66	18.07	5.13	4.66	0.66	18.07
Real GDP per cap. (thous. €)	24.46	6.49	13.71	44.36	24.58	6.98	14.15	44.36
Unemployment rate (%)	8.42	3.23	1.40	18.40	12.81	4.67	4.50	22.10
Left-wing government (%)	47.23	46.72	0.00	100.00	46.43	43.26	0.00	100.00
Bailout (dummy)	0.59	0.24	0.00	1.00	0.08	0.27	0.00	1.00
City (dummy)	0.20	0.40	0.00	1.00	0.19	0.39	0.00	1.00
East (dummy)					0.31	0.46	0.00	1.00
Total expenditure (% GDP)	18.09	2.59	12.34	23.78	20.21	6.06	12.34	37.19
Personnel (% total)	40.90	3.33	29.60	48.17	36.68	4.21	28.48	45.20
Other operating (% total)	15.04	1.85	11.44	22.84	15.25	2.28	11.23	24.12
Real investment (% total)	10.83	4.25	1.63	23.08	8.56	3.49	1.59	20.24
Ratio consumpt. / invest.	6.16	3.02	2.29	28.38	7.93	5.87	2.51	35.07
General publ. serv. (% total)	7.89	1.01	5.47	12.04	8.26	1.27	5.37	12.57
Law & order (% total)	7.28	0.93	5.28	9.87	7.92	1.04	5.09	10.48
Education (% total)	19.26	1.89	9.69	24.45	18.43	1.87	12.88	23.16
Trans. & commun. (% total)	5.47	1.48	1.75	9.02	5.76	1.53	1.75	8.96
Social services (% total)	16.79	3.31	10.23	23.55	19.12	3.17	12.50	26.18

Figure 2: Public debt of state and local governments, 1974-2010 (% of GDP)



Note: Capital market debt, core budgets. Berlin: until 1990 West-Berlin. Source: Federal Statistical Office, own calculations.

Table 7: Economic, social, and demographic indicators of the German federal states (2008-10)

State	Area	Popul.	Density	Catholic	GDP real	Sector. Employment		Unempl.	Trade
						Agricult.	Industry		
	km^2	1,000	Inh./km^2	% popul.	€/inh.	% total	% total	%	% GDP
Baden-Württemberg	35,752	10,749	301	36.5	29,774	1.8	32.0	5.1	75.6
Bavaria	70,549	12,516	177	55.0	32,328	2.8	28.2	4.9	61.0
Hesse	21,115	6,065	287	24.7	32,477	1.4	22.0	7.2	52.0
Lower Saxony	47,618	7,942	167	17.5	24,211	3.3	23.8	8.3	64.6
North Rhine-Westphalia	34,084	17,906	525	41.6	26,991	1.5	23.7	9.3	61.2
Rhineland-Palatinate	19,847	4,022	203	45.3	23,931	2.8	25.5	6.3	62.4
Saarland	2,569	1,027	400	63.4	25,970	0.8	27.8	8.0	79.1
Schleswig-Holstein	15,763	2,833	180	6.0	24,367	3.2	19.1	8.3	49.6
West German non-city									
Mean	*30,912*	*7,882*	*280*	*36.3*	*27,506*	*2.2*	*25.3*	*7.2*	*63.2*
VC (%)	*64.0*	*66.7*	*42.7*	*49.7*	*12.1*	*40.1*	*14.9*	*20.9*	*15.1*
Berlin	892	3,435	3,851	9.3	23,914	0.3	13.0	15.4	22.0
Bremen	404	661	1,636	12.4	37,333	0.4	20.5	12.6	91.4
Hamburg	755	1,777	2,353	10.1	43,695	0.5	14.3	9.2	108.6
City states									
Mean	*684*	*1,958*	*2,614*	*10.6*	*34,981*	*0.4*	*15.9*	*12.4*	*74.0*
VC (%)	*30.1*	*58.2*	*35.3*	*12.3*	*23.6*	*20.1*	*20.6*	*20.3*	*50.6*
Brandenburg	29,477	2,518	85	3.1	19,160	3.5	22.7	13.1	45.3
Meckl.-West Pomerania	23,174	1,658	72	3.3	19,742	3.9	18.3	14.4	27.0
Saxony	18,414	4,180	227	3.6	20,607	2.1	26.7	13.5	40.2
Saxony-Anhalt	20,445	2,370	116	3.5	19,333	2.9	24.0	14.2	44.3
Thuringia	16,172	2,259	140	7.8	19,793	2.6	29.2	11.6	34.4
East German states									
Mean	*21,536*	*2,597*	*128*	*4.3*	*19,727*	*3.0*	*24.2*	*13.4*	*38.2*
VC (%)	*21.3*	*32.5*	*42.9*	*41.7*	*2.5*	*21.0*	*15.2*	*7.4*	*17.8*
All states	357,030	81,917	229	30.5	27,240	2.1	24.9	8.5	68.6
VC (%)	*81.1*	*91.5*	*152.5*	*91.8*	*25.8*	*54.8*	*21.9*	*33.2*	*39.2*

Notes: Three-year averages. Mean: unweighted (except for: All states); VC: unweighted coefficient of variation. Source: Federal Statistical Office, own calculations.

Table 8: Debt, total expenditure and revenue of state and local governments (% of GDP)

State	Public debt		Total expenditure		Total revenue		Tax revenue	
	1974-76	2008-10	1974-76	2008-10	1974-76	2008-10	1974-76	2008-10
Baden-Württemberg	10.7	16.4	19.7	14.0	18.1	13.8	11.3	10.3
Bavaria	11.4	9.2	20.3	14.8	19.0	14.1	11.4	10.2
Hesse	17.3	19.2	21.7	14.7	19.0	13.4	12.1	10.1
Lower Saxony	16.8	28.1	22.6	16.4	19.8	15.7	11.5	11.1
North Rhine-Westphalia	10.1	28.7	18.4	15.5	16.4	14.6	11.2	10.6
Rhineland-Palatinate	17.9	31.7	21.5	17.6	19.1	15.6	11.0	11.1
Saarland	18.2	38.8	21.1	17.8	13.2	5.2	10.8	9.8
Schleswig-Holstein	15.6	36.6	21.8	19.4	15.6	7.5	11.1	11.1
West German non-city								
Mean	*14.8*	*26.1*	*20.9*	*15.8*	*18.6*	*14.5*	*11.3*	*10.5*
VC (%)	*21.8*	*36.9*	*6.0*	*7.4*	*5.5*	*6.6*	*3.2*	*4.5*
Berlin	11.6	63.3	32.3	23.4	30.3	22.8	7.9	11.2
Bremen	16.8	59.7	23.0	15.8	18.6	12.7	11.8	7.9
Hamburg	14.4	27.1	18.5	12.6	16.9	12.0	12.0	9.8
City states								
Mean	*14.3*	*50.0*	*24.6*	*17.3*	*22.0*	*15.8*	*10.6*	*9.6*
VC (%)	*14.8*	*32.6*	*23.5*	*26.2*	*27.1*	*31.2*	*17.6*	*13.9*
Brandenburg		34.6		23.2		23.0		12.1
Meckl.-West Pomerania		31.9		23.3		24.2		11.9
Saxony		11.6		21.5		22.3		11.8
Saxony-Anhalt		43.8		23.2		23.3		11.9
Thuringia		36.8		22.5		22.3		11.8
East German states								
Mean		*31.7*		*22.7*		*23.0*		*11.9*
VC (%)		*34.0*		*2.9*		*3.1*		*0.9*
All states	12.8	24.6	20.4	16.0	18.3	15.3	11.3	10.6
VC (%)	*20.2*	*44.9*	*16.4*	*20.6*	*18.3*	*25.5*	*9.6*	*9.9*

Notes: Three-year averages. Mean: unweighted (except for: All states); VC: unweighted coefficient of variation. Source: Federal Statistical Office, own calculations.

Table 9: Determinants of public deficits, 10 West German states, 1974-2010

Variable	Pooled OLS					Fixed effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Population			-0.03	-0.03*	-0.04**			0.01	-0.34**	-0.31*
			(0.02)	(0.01)	(0.01)			(0.21)	(0.14)	(0.15)
Real GDP p.c.			-0.09***	-0.07**	-0.08**			-0.02	0.05	0.02
			(0.03)	(0.03)	(0.03)			(0.04)	(0.05)	(0.02)
Unemployment			0.06	0.10	0.01			-0.04	-0.02	-0.06
			(0.07)	(0.07)	(0.07)			(0.06)	(0.04)	(0.06)
Left-wing government			0.00	0.00				0.00	0.00	
			(0.00)	(0.00)				(0.00)	(0.00)	
Total expend. (% GDP)	0.22***	0.18***				0.19**	0.12			
	(0.04)	(0.05)				(0.07)	(0.07)			
Personnel	-0.03		-0.07**			-0.04		-0.06		
	(0.03)		(0.02)			(0.02)		(0.04)		
Other operating	-0.11		-0.07			-0.06*		-0.04		
	(0.08)		(0.06)			(0.03)		(0.03)		
Real investment	-0.05		0.01			0.09***		0.07***		
	(0.03)		(0.04)			(0.02)		(0.02)		
Consumpt. / Invest.				-0.00					-0.04**	
				(0.03)					(0.01)	
General publ. services		0.13			0.05		-0.20**			-0.24***
		(0.15)			(0.13)		(0.08)			(0.04)
Law & order		0.09			-0.03		-0.10			-0.17
		(0.15)			(0.13)		(0.12)			(0.12)
Education		-0.05					-0.03			
		(0.05)					(0.08)			
Transp. & communic.		-0.21			-0.28**		-0.03			0.00
		(0.14)			(0.12)		(0.13)			(0.11)
Social services		0.02			0.05		0.01			0.00
		(0.06)			(0.06)		(0.09)			(0.09)
R^2	0.55	0.57	0.57	0.55	0.58	0.77	0.76	0.76	0.74	0.76
Nobs	370	370	370	370	370	370	370	370	370	370

Notes: All regressions include fixed year effects, the OLS pooled model a dummy for city states, and the fixed effects model a dummy for Bremen and Saarland during the bailout period (coefficients not reported). White/Huber robust standard errors adjusted for within-group clustering in parentheses. ***, **, and * indicate significance at 1%, 5% and 10% levels. R^2: adjusted (OLS), within (fixed effects).

Table 10: Determinants of public debt, 10 West German states, 1974-2010

Variable	Instr. var., pooled					First differences, pooled				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Population			-0.41***	-0.49***	-0.59***			0.33	0.17	-0.02
			(0.05)	(0.06)	(0.08)			(2.19)	(2.12)	(2.28)
Real GDP p.c.			-1.63***	-1.03***	-0.98***			-0.73**	-0.72**	-0.76**
			(0.15)	(0.15)	(0.15)			(0.28)	(0.28)	(0.28)
Unemployment			0.82***	1.63***	1.47***			0.21**	0.23***	0.26***
			(0.25)	(0.27)	(0.28)			(0.09)	(0.07)	(0.07)
Left-wing government			0.02***	0.02**				0.01	0.01	
			(0.01)	(0.01)				(0.00)	(0.00)	
Total expend. (% GDP)	3.23***	2.93***				0.37**	0.58***			
	(0.23)	(0.26)				(0.16)	(0.16)			
Personnel	-0.99***		-1.39***			0.04		-0.03		
	(0.22)		(0.19)			(0.04)		(0.05)		
Other operating	-0.64		-0.06			-0.08		-0.09		
	(0.48)		(0.32)			(0.11)		(0.11)		
Real investment	-1.53***		-0.90***			-0.16		-0.12		
	(0.17)		(0.17)			(0.11)		(0.10)		
Consumpt. / Invest.				1.18***					0.07	
				(0.25)					(0.04)	
General publ. services		1.86**			-0.29		0.07			-0.02
		(0.85)			(0.81)		(0.22)			(0.21)
Law & order		-2.57***			-3.38***		0.37			-0.36
		(0.95)			(0.58)		(0.31)			(0.39)
Education		-0.14					0.01			
		(0.40)					(0.08)			
Transp. & communic.		-1.13**			-1.56***		-0.13			-0.04
		(0.54)			(0.41)		(0.13)			(0.16)
Social services		1.24***			1.02***		0.22***			0.10
		(0.28)			(0.20)		(0.06)			(0.08)
R^2	0.86	0.83	0.92	0.90	0.91	0.49	0.49	0.52	0.52	0.51
Nobs	360	360	360	360	360	360	360	360	360	360

Notes: All regressions include fixed year effects, and a dummy for city states (coefficients not reported). White/Huber robust standard errors adjusted for within-group clustering in parentheses. ***, **, and * indicate significance at 1%, 5% and 10% levels. R^2: centered (instr. var.), adjusted (first differences).

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