Coalition governments, cabinet size, and the common pool problem: evidence from the German States

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Abstract

The theoretical literature on common pool problems in policy making suggests that government fragmentation increases public expenditures. In parliamentary regimes, the fragmentation hypothesis primarily refers to (i) coalition governments and (ii) cabinet size. This paper explores the effect of coalition governments and cabinet size on public expenditures with panel data covering all 16 German States over the period 1975-2005. Identification is facilitated by the large within-variation in the incidence of coalition governments and the size of the cabinet in the German States. I also exploit a feature of state electoral laws to construct an compelling instrument for the likelihood of coalition governments.

Keywords: Government fragmentation, Common pool problems, Coalition government, Cabinet size, Public expenditures

JEL codes: E61, E63, H61

1   Introduction

The literature on the determinants of the size of the public sector can be classified along three lines. The traditional strand relates public expenditures to underlying economic trends. A famous contribution is Wagner's Law, according to which public expenditures increase disproportionately with economic development (Wagner, 1911). This theory perceives the government as a benevolent agent who responds optimally to developments that are outside of its control. It is, however, contentious whether governments are truly benevolent. Perhaps to emphasize their skepticism toward the benevolence assumption, Brennan and Buchanan (1980) go as far as to model the government as a Leviathan who is only interested in revenue maximization. In the Leviathan-framework, the size of the public sector is primarily explained by the extent to which the fiscal constitution is capable to limit the ability of the government to over-tax citizens.[1]

In reality governments are neither completely benevolent nor do they behave exclusively as Leviathans. The third strand of the literature focuses on the role of politics and applies neoclassical tools to model political decisions as the outcome of the interactions of self-interested and rational agents who respond optimally to the incentives they face. Within the context of this political economics literature, the seminal contributions of Weingast et al. (1981) and Shepsle and Weingast (1981) on common pool problems in policy making suggests that government fragmentation is one important determinant of public expenditures.

In countries with parliamentary regimes, the term government fragmentation typically refers to (i) the number of parties and (ii) the number of ministers represented in the government.[2] The two variants of government fragmentation can result in common pool

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[1]For example, it follows from the Leviathan model that public expenditures will decline in the degree of fiscal decentralization. The reason is that fiscal decentralization will result in tax competition, which will diminish the ability of the the government to over-tax citizens.

[2] The original model was developed with US-style legislatures in mind and usually refers to the size of the legislature. Another variant of government fragmentation in countries with presidential regimes

problems if the benefits of public expenditures can be targeted to well-defined constituencies whereas the costs are shared equally by all members of the government. The reasoning is as follows. Each member of the government has to weigh the benefits of public expenditures against their cost. If expenditures can be targeted, the constituency of a government member fully internalizes the benefits. The cost associated with public expenditures is the political price that has to be paid for either higher taxes or more debt. If the cost for targeted expenditures is shared among all members of the government, each individual member only pays a small fraction. Consequently, overall demand for public expenditures will increase in the number of government members. And given that "government members" can be defined either in terms of parties or in terms of ministers, the fragmentation theory predicts that expenditures will increase the number of parties represented in the government and the size of the cabinet.

A large empirical literature attempts to test the hypothesis that coalition governments and governments characterized by large cabinets spend more. The relevant studies can be distinguished by whether they use cross-country or sub-national data. Notable cross-country studies are Roubini and Sachs (1989a,b), Perotti and Kontopoulos (2002), Woo (2003), and Bawn and Rosenbluth (2006). This strand of the literature tends to conclude that both coalition governments and large cabinets exacerbate the common pool problem and cause either more spending or higher deficits. However, one problematic feature of the cross-country studies is that the objects of study, being countries, are very heterogeneous. It may be difficult to fully account for the cross-country heterogeneity by means of control variables.

A recent literature attempts to addresses this problem by using data at the sub-national level. Ashworth and Heyndels (2005), for example, show that in Flemish municipalities, coalition governments and large cabinets are in general associated with higher spending.

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refers to situations with divided government, i. e. where the executive and the legislature are controlled by different parties (Alt and Lowry, 1994).

Le Maux et al. (2011) find for French Departments that the number of parties in the ruling coalition is positively related to social expenditures. While these studies use data from fairly low levels of government, Schaltegger and Feld (2009) use data at the level of the Swiss Cantons. Compared to the Flemish municipalities or the French Departments, the Swiss cantons have significant political autonomy and are responsible for a large share of total public expenditures. Schaltegger and Feld (2009) find that public spending increases in the size of the cabinet while the effect of coalition governments is more ambiguous. One problematic feature of their study is, however, that over-time variation in their coalition and cabinet size variables is limited. The small within-variation in their data forces them to base their conclusions primarily on the variation between cantons. Consequently, there could remain unobserved factors that influence both public expenditures and government fragmentation simultaneously.

I study in this paper whether coalition governments and large cabinets cause larger public spending with panel data covering all 16 German States over the period 1975-2005.[3] As the Swiss Cantons, the German States offer an excellent opportunity to investigate the effects of fragmented governments at a powerful and fiscally important tier of government. The German States have similar political and legal systems, a common history, and close linguistic and cultural ties. Because of the homogeneity of its states, the German federation can serve as an natural laboratory. But unlike the Swiss Cantons, the German States exhibit large within-variation in the incidence of coalition governments and the number of cabinet ministers, allowing the identification of the public spending effects of coalition governments and large cabinets by means of fixed effects regressions.

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[3] In contrast to Schaltegger and Feld (2009), I focus on whether a state government is formed by a single party or by a coalition of parties, but not on the size of the coalition. The reason for this is that state governments in Germany are typically formed by either a single party or by a coalition of two parties. Coalitions with three parties are extremely rare and coalitions with more than three parties were never formed. I investigate in a robustness check whether the size of the coalition matters and confirm that explicitly controlling for the number of coalition partners does not change the results.

To further account for possible endogeneity, I exploit a feature of the electoral laws in all states that relates vote shares to seats in state parliaments in an non-linear fashion to construct a compelling instrument for the likelihood of coalition governments. The instrument is the number of parties in the state parliament. The reason why the number of parties is strongly correlated with the incidence of coalition governments is as follows. The electoral laws in all German States state that only parties with more than five percent of the vote share may receive seats in parliament.[4] Since the total number of seats in the state parliament is basically fixed[5], parties that actually enter parliament receive more seats than would be warranted by their vote share, and the disproportionately increases the fewer parties are in parliament. Therefore, the fewer parties are in parliament, the more feasible it will be for a single party to form a government with a parliamentary majority. I illustrate the electoral system of the German States and discuss the validity of this instrument in more detail further below.

2 The fiscal and political landscape in the German States

Germany consists of sixteen federal states: eleven West-German and five East-German (see Figure 1 for a map).[6] The fiscal constitution grants all states significant spending but only minuscule tax autonomy. Each of the states can borrow and spend according to its own discretion, while rates and bases for most taxes are the same throughout the federation. Variation in state level taxation only exists for some unimportant taxes.

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[4]There are two minor exceptions. See below.

[5]Under certain circumstances, there might be minor variations in the number of seats. See below.

[6]The state of Berlin is somewhat of a hybrid because it was formed in 1991 by merging the western with the eastern part of the city. In the following, I treat Berlin as a West-German State.

Total revenues available to a state in a given year consist of tax revenues and transfers. The most important taxes for the states are the income tax, the corporate tax, and the value added tax. However, states have to share the revenue from these taxes with the federal government. Collected tax revenues per capita differ significantly between states because of differences in the value of their tax bases. The transfer system is designed to equalize the differences in tax capacity. In general, revenue disparities between states after transfers are much lower than the initial disparities.

Apart from tax revenues and transfers, states can fund their expenditures through borrowing. In principle, there was a rule based constraint which limited state borrowing during the 1975-2005 period: this constraint required that states do not borrow more than they spend on net-investments. In practice, states could borrow as much as they wanted as the rule could be legally broken in a if the state finance minister ascertained a "macroeconomic disequilibrium". Moreover, states are relatively free to classify expenditures that are in reality consumptive as net-investments. Market-based borrowing restrictions are also almost non-existent as rating agencies tend to rate all German state bonds as highly secure, even those of the most indebted states, because a default of a state is perceived as highly unlikely. The reason is the widespread belief that the federal government and other states will eventually provide a bail out to a state in a fiscal crisis (Seitz, 1999).

The federal constitution defines a wide set of public goods which have to be provided by the sub-national tier. States are expected to finance, for example, all stages of education, cultural affairs, the police, and many other public goods.[7] The policy areas for which the states are responsible make up more than half of public spending in the German federation. While there are some federal mandates defining minimum levels for the state

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[7]The sub-national tier consists of states and different types of localities. However, the localities are legally subordinate and accountable to the states (Kipke, 2000). In particular, the federal contitution defines local finances as part of state finances (Art. 106 Abs. 9 GG). All fiscal variables discussed in the following (notably state expenditures and revenues per capita) are consolidated between states and localities.

public goods, states can in general decide autonomously how much and in what way they want to spend (Seitz, 2008). Figure 1 shows that the states use their expenditure autonomy extensively. The average real expenditures per capita during the 1975-2005 period in Berlin, Bremen, Hamburg, or the East-German states was almost twice as high as in Bavaria and Lower-Saxony. There is also significant amount of over-time variation in state spending as suggested by Figure 2. Average expenditures per capita in the West-German states increased until 1990, then spiked dramatically, presumably because of the need to fund the German unification, only to return to pre-1990 levels shortly thereafter. From 2000 onward, a slow decline in expenditures per capita can be observed in the West-German States. In East-Germany, expenditures increased until the mid-nineties, presumably because of the need to modernize public infrastructure and delays in reducing the number of public employees in the aftermath of unification (Reichard, 2001). From the mid-nineties onward, however, expenditures per capita have been on a downward trajectory in East-Germany. By 2005, they had fallen to the level of the West-German states.

Politically, the German States are parliamentary democracies. Each state has a unicameral parliament elected by its residents.[8] Elections to the state parliament are governed by electoral laws that are, while not identical, very similar throughout the federation. Most importantly, all states have a so called "five-percent hurdle" that limits the number of parties that may enter parliament. This hurdle – introduced in order to avoid a repetition of the massive party fragmentation in the Reichstag during the Weimar Republic and the ensuing difficulties in forming a government with sufficient parliamentary support– implies that only parties which receive at least five percent of the votes get seats in the parliament.[9] This feature of the electoral system ensures that parties that are allowed to enter

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[8]Bavaria's parliament had a second chamber, the Senate, until 1999. The Senate was abolished through a popular referendum because it was essentially powerless.

[9]There are two exceptions. Parties with less than five percent may enter the state parliament in some states if some of their candidates win in their districts (the number of districts that have to be carried by the party to enter parliament through this rule varies between states). This exception is fairly irrelevant

parliament receive a larger share of seats than would be warranted by the vote share, which makes it easier to form a governments with majority support in parliament. I discuss the consequences of this feature of the electoral system in more detail in Section 5.

In 1975 there were three major parties both at the federal level and in each of the eleven West-German States: the Christian Democratic Union (CDU), the Social Democratic Party of Germany (SPD), and the Free Democratic Party (FDP). In general, the CDU is perceived as culturally conservative (i. e. supporting "traditional" values) and moderately market-oriented. The SPD is moderately left-leaning on economic and moderately liberal on cultural issues. The FDP is culturally liberal and market-oriented with respect to its economic policies.

By 2005 the number of mainstream parties in the now unified Germany had increased to five. In addition to the CDU, SPD, and FDP, the Green Party and Party of Democratic Socialism (PDS) had entered the political scene.

The Green Party started to receive significant vote shares at the end of the seventies by focusing on environmental and peace issues (recall that the cold war was still ongoing at the time). It is moderately left-leaning on economic policies. Yet, its main support base are civil servants rather than the working class. With respect to cultural issues, it is generally perceived as very liberal.

By the mid-eighties and early nineties, the Green Party had entered most state parliaments and was even part of some state governments as a coalition partner of the SPD. This change in the German party system is reflected in Panel (a) of Figure 3.[10] According

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and has hitherto only applied to the PDS, and only at the federal level. At the state level, the PDS either easily passed the five-percent hurdle (in the East-German states) or did not win any direct mandates (in the West-German states). There is also an exception for the party of the Danish minority (the SSW) in the state of Schleswig-Holstein. For this party, the five-percent hurdle is waived.

[10]There is some ambiguity in determining the correct coding of the number of parties in parliament and other political variables in election years. The type of government, the size of the cabinet, and the number of parties in parliament typically change after an election. The election dates, however, differ both between and within states. I apply the following rule: if an election in year t takes place after July 1th, I code the political variables for year t according to the situation early in the year (since the old administration

to this panel, the median number of parties in West-German state parliaments was three until the mid-eighties. Then the median number jumps to four and remains there until the end of the sample period. The evolution of the average number of parties in state parliaments, too, reflects the rise of the Green Party. This number remains around three until the mid-eighties and then increases fairly steeply to four and remains there until 2005.

The other addition to the German party system during the 1975-2005 period was the Party of Democratic Socialism (PDS). Unlike the Green Party, the PDS did not represent a new political movement. Rather, it was the former ruling party of the German Democratic Republic (GDR) – the Socialist Unity Party (SED)– that had reconstituted itself as the PDS after the demise of the GDR in 1990. The importance of the PDS in East-Germany is implicitly reflected in Panel (b) of Figure 3. According to this panel, the median number of parties in the East-German state parliaments was five in the first half of the nineties. In the mid-nineties, the median number dropped to three and remained there until the very end of the sample period, as both the FDP and the Green Party found it increasingly difficult to collect sufficient votes to enter parliament. The three parties that remained relevant in the East-German party system were the CDU, the SPD, and the PDS.

Figure 4 shows the average number of parties in the East- and West-German state parliaments. This figure suggests that states differ in their openness towards smaller parties. In Bavaria, the average number of parties represented in parliament was only three. In states like Baden-Württemberg, Berlin, and Bremen, the average number of parties was over four during the 1975-2005 period.

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has governed more than half of the year). If the election takes place before July 1th, I code the political variables according to the situation early in the year.

For example, assume that the SPD has received more than 50% of the seats in an election in state i in year t, so the next administration will be formed by the SPD. Assume furthermore that the current administration is a CDU-FDP coalition. If the election took place on or after July 1st, I code the coalition variable as 1. If the election took place before July 1th, I code the coalition variable as 0. I apply the same rule for the cabinet size variable, the parties in parliament variable, and the number of seats in parliament variable.

The CDU and SPD were generally referred to as the "big" parties during the 1975-2005 period because they typically received between 30% to 40% of the votes in each election.[11] The FDP and the Green Party were referred to as the "small" parties. The PDS is difficult to classify along this dimension. In East-Germany, it was not uncommon for the PDS to receive around 25% of the votes during the 1975-2005 period. It may therefore be legitimately classified as a big party in the eastern part of Germany. In West-Germany, however, the PDS never managed to get more than five percent of the votes (with the exception of Berlin).

Apart from the five mainstream parties, the party system consists of a multitude of fringe parties. Most notably, there are several extreme right-wing parties which manage to enter state parliaments from time to time (by obtaining more than five percent of the votes).[12] The five mainstream parties, however, have always shunned them. Most importantly, extreme right-wing parties were never part of any coalition government. Usually these extreme right-wing parties only last one or two legislative period in parliament because they fail to receive more than five percent of the votes in subsequent elections.[13]

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[11]By now, this characterization is probably too simple because the Green Party has in some states, most notably in Baden-Württemberg, over-taken the SPD in terms of votes. Nevertheless, the general perception is that the SPD is still the biggest left-wing party.

[12]Most notably the National Democratic Party of Germany (NPD), the Democratic Peoples' Union (DVU), and the (German) Republicans (REP).

[13]Apart from the extreme right-wing parties, there are a number of regionally based "protest" parties, i. e. parties which try to offer an alternative to the established parties. The most notable was the so called Schill Party (named after the founder of the party, the official name was *Partei Rechtsstaatlicher Offensive*). This main focus of this party were law and order issues. After entering the state parliament in Hamburg in the election of 2001, the Schill Party even formed a three-party coalition government with the CDU and the FDP, with the CDU as the senior partner. However, this government soon fall apart amids a scandal. Subsequently, the Schill Party became irrelevant. In the following, I treat the CDU-FDP-Schill Party government during the 2001-2004 period in Hamburg as a CDU-FDP government and thus as a right-wing government.

Another important protest party was the STATT Party. This party entered the state parliament of Hamburg in 1993. Subsequently, it concluded a "coalition-like" agreement with the SPD by which the SPD received the support of the STATT Party. In exchange the SPD agreed to appoint a number of ministers without party affiliations but chosen by the STATT Party. While the STATT party thus played an important role for the government of Hamburg during the 1993-1997 period, I nonetheless code this period as a sole SPD government since no official members of the STATT Party were represented in

The state government requires a majority in the parliament to govern effectively. Minority governments are therefore very rare and generally short-lived.[14] As a rule each of the two big parties forms a single-party government if it receives more than 50% of the seats. There have been some exceptions to this rule, but not in recent times. That is, a big party with an absolute majority has sometimes invited a small party to join a coalition, but the small parties have always declined to do so during the 1975-2005 period. One example is Hesse after the elections of 2003 where the CDU gained an absolute majority but nonetheless invited the FDP to join the cabinet. The FDP declined.

If one of the big parties has less than 50% of the votes in parliment, negotiations to form a coalition government are held. The need to hold a new election because of the inability to form a government almost never arises as the parties represented in parliament can almost always agree on some type of coalition. A big party typically prefers to form a coalition with a small party if they together can achieve a majority in parliament. If this should not be possible, the two big parties usually form a coalition. Only in three cases, coalition governments consisting of three parties have been formed (one big and two small parties). Coalition governments consisting of more than three parties were never formed.

In principle, every party can form a government with any other party. In practice, only certain types of coalition governments have been formed in the 1975-2005 period. Figure 5 reports the relative frequencies of different types of (coalition and single-party) governments. During the sample period, coalition governments between the CDU and the Green Party never took place. Similarly, neither the CDU nor the FDP collaborated with

the cabinet. Coding this government as a coalition government does not change the findings, however (regression results are available upon request)

[14]Most minority governments are essentially caretaker governments that last only a few months before new elections can be held. The only meaningful exception was the SPD-Green Party government in Saxony-Anhalt during 1994-1998 and the sole SPD government in Saxony-Anhalt during 1998-2002. These two governments had the implicit support of the PDS, even though it was not formally part of the government. It might be argued that the sole SPD government in Saxony-Anhalt was in reality a coalition with the PDS in all but name. However, (unreported) regression results with a redefined coalition variable that codes Saxony-Anhalt as having a coalition government during the 1998-2002 period are very similar to those reported in the paper.

the PDS. In West-Germany, the SPD and the Green Party also refused to cooperate with the PDS. (Berlin, however, is again an exception: the SPD did form a government with the PDS there). Figure 5 also reveals some additional ideological patterns in coalition formation. The CDU tends to form coalitions with the FDP whereas the SPD tends to form coalitions with the Green Party, even though some coalitions between the SPD and the FDP also took place. Around half of all state governments in the 1975-2005 period have been formed by a single party. The CDU has formed more single party governments than the SPD, but the SPD has also managed to form a significant number of single party governments.

Panel (a) in Figure 6 shows the number of state governments in West-Germany ruled by coalition governments for each year between 1975-2005. Five of the eleven western states were ruled by coalition governments in 1975. By 1980, their number had fallen to two and in 1985 even declined to one. Thereafter, there was a continuous increase in the number of coalition governments. In 2003, eight states were governed by coalition governments. In 2005, the number still stood at seven. Panel (b) reports the number of coalition governments during the 1991-2005 period in East-Germany. The eastern states start out with four coalition governments. Their number declines to two around 2000. By 2005, however, their number had once again risen to four.

Figure 7 reports the relative frequency of coalition governments in each of the German States. It reveals that all but two states have experienced both single-party and coalition governments during the sample period. The first exception is Bavaria which was consistently ruled by the CSU (a regional variant of the CDU). The second exception is Mecklenburg-West Pomerania, which was consistently ruled by a shifting set of coalition governments. On the other hand, single-party and coalition governments were almost equally common in States like North Rhine-Westphalia and Bremen. Overall, both Figure

6 and 7 confirm that there is a significant amount of between and within-variation in the incidence of coalition governments.

Once agreement on a government with a legislative majority has been reached between the parties involved, the cabinet is formed. The process starts with the election of a state prime minster by the state parliament. The state prime minister then appoints his cabinet. In some states the cabinet has to be approved by the state parliament, but this is only a formality. While the state prime minister is in theory free to choose the cabinet members and the scope of the individual ministries, the parties involved in the government have significant influence on the structure of the cabinet and the identity of the minsters. There are some core ministries which exist in all states, for example the finance or the interior ministry. The number and scope of the other ministries varies both between and within states. For example, there are separate health and social ministries in some state-year pairs. In others, these two policy areas are covered by a single ministry.

Panel (a) of Figure 8 reports the evolution of the average cabinet size for West-German.[15] This panel shows that in 1975, the average cabinet had around 10 members. Average cabinet size steadily increased to 12 in 1990. From 1995 onward, the average cabinet size started to decline again and reached 10 in 2005. In East-Germany, the average cabinet size was 10 in 1991. During most of the 1990s, this number was slightly larger than 10. From 2000 onward, average cabinet size was slightly less than 10.

Figure 9 reports the distribution of the average cabinet size in the German States during the 1975-2005 period. This figure suggests that there are significant differences between the German States. Average cabinet size in Berlin was almost 12.5 whereas Saarland had an average cabinet size of around 8.3. The distribution of the average cabinet size was between 9.5 and 10.6 in East-Germany. Overall, the descriptive statistics reported in

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[15]The original data source is Schnapp (2006). The data were collected as part of a research project of the German Science Foundation. I completed missing values using information supplied by different state governments or state parliaments in personal communications.

Using the raw data to determine the number of cabinet ministers involves some difficult choices. The most important issues are the following. First, certain "*Staatssekretäre*" (State Secretaries) have the same status as cabinet minsters in some states (usually a *Staatssekretär* is a deputy of a minister and subordinate to him). In particular, they can participate and vote in cabinet meetings. Second, some cabinets have a minster who is responsible for "federal affairs", whereas in other cabinets this task is assumed by either the state prime minister or by cabinet ministers whose prime responsibility is a different policy area. Third, each state has a "*Staatskanzlei*" (or alternatively a "*Staatsministerium*") which is either led by a minister or a *Staatssekretär*. The Staatskanzlei is different from the other ministries as it is essentially the office of the state prime minster and coordinates policies among all other ministries. Fourth, sometimes one minister leads two separate ministries.

I made the following decisions regarding the problematic cases described above. First, I do not count *Staatssekretäre* as members of the cabinet, except certain cases where the *Staatskanzlei* is led by a *Staatssekretär* (see below). Second, I count the ministry for federal affairs as a separate ministry if it is led by a minister who has no other cabinet post. (i. e. if it is led by a minister who has another cabinet post – i. e. the state prime minister or some other cabinet minister– I do not count it as a separate ministry.) Third, I do not count the *Staatskanzlei* as a separate ministry except if the head of the Staatskanzlei (irrespective of whether he is formally a minister or a *Staatssekretär*) is responsible for some additional tasks (for example, the *Staatssekretär* in the cabinet formed in Baden-Württemberg from 2001 to 2006 was also responsible for "European issues", consequently I count the Staatskanzlei as a separate ministry in this cabinet). Fourth, if one minister heads two separate ministers, I increase the cabinet size by two.

There were some additional but relatively minor decisions I had to make, for example regarding a reshuffling of the cabinet within an legislative period (I ascribe any changes in-between election years to the year in which the reshuffling took place irrespective of whether it happened in the first or second half) or how to treat a strange arrangement where a member of the cabinet is a a *Staatssekretär* but is called a minister (a so called "*Staatssekretär mit der Amtsbezeichnung Minister*" – I count this *Staatssekretär* / minister as a proper member of the cabinet). Full details are available upon request.

Figure 8 and 9 suggests that there is a significant degree of variation in cabinet sizes, in particular within states.

3 Methodology and empirical model

As indicated previously, state governments have substantial autonomy in determining their expenditures. The hypothesis I investigate is whether coalition governments and governments with large cabinets spend more than single-party or small cabinet governments. An equivalent way to pose this question is whether the increase in expenditures is larger if a coalition government or a government with a large cabinet assumes office.

Panel (a) of Figure 10 compares average real expenditures per capita in coalition and single-party governments during the 1975-2005 period. This panel shows that coalition governments spend on average about 530 Euros more than single-party governments. Panel (b) reports the averages for each of the cabinet sizes that German states exhibited during the 1975-2005 period. There appears to be a positive relationship between average cabinet size and public expenditures. However, the effect only sets in a significant way once the cabinet has more than 10 members.

In any case, the question is whether the positive bivariate relationships between public expenditures, coalition governments, and cabinet size continue to prevail in a more formal analysis. A model to formally test the fragmentation hypothesis should relate the increase in public expenditures to the two types of government fragmentation and other potential determinants of expenditures. It can be specified as follows:

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\begin{aligned}
\Delta \text{Expenditures per cap.}_{i,t} = & \alpha + \beta_1 \text{Coalition government}_{i,t} + \beta_2 \text{Cabinet size}_{i,t} \\
& + \gamma' \text{Expenditures per cap.}_{i,t-1} + \delta \mathbf{x} + \epsilon_i,
\end{aligned}
\tag{1}
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where $\Delta\text{Expenditures}_{i,t} = \text{Expenditures}_t - \text{Expenditures}_{t-1}$. This model states that the change in real public expenditures per capita is a function of whether the government consists of a coalition of parties or is formed by a single party, the size of the cabinet, and the level of expenditures in the previous period. In addition, a set of variables $\mathbf{x}$ are included as potential determinants of public expenditures.

Equation 1 can be written equivalently as a dynamic panel data model with expenditures per capita in levels:

$$\text{Expenditures per cap.}_{i,t} = \alpha + \beta_1\text{Coalition government}_{i,t} + \beta_2\text{Cabinet size}_{i,t} \\ + \gamma\text{Expenditures per cap.}_{i,t-1} + \delta\mathbf{x} + \epsilon_i. \tag{2}$$

This empirical model might nonetheless suffer from an omitted variables problem because it does not control for developments that affect all states in a similar way. This is particularly important as the object of study are sub-national jurisdictions. First, the federal government might implement policies that affect expenditures in all states equally. Similarly, there are political developments that affect all states in a similar way. One notable example is the rise of the Green Party which happened simultaneously throughout the federation. It is possible that such unobserved political or fiscal developments are correlated with both government fragmentation and public expenditures. The most flexible approach to control for these developments is to include year fixed effects. I therefore expand Equation 2 as follows:

$$\text{Expenditures per cap.}_{i,t} = \alpha + \nu_t + \beta_1\text{Coalition government}_{i,t} + \beta_2\text{Cabinet size}_{i,t} \\ + \gamma\text{Expenditures per cap.}_{i,t-1} + \delta\mathbf{x} + \epsilon_i, \tag{3}$$

where ν_t is a dummy variable that is equal to 1 in year t.

This model is still incomplete, however. The reason is that states which are more likely to be ruled by coalition governments for some (possibly unobserved) reason might also be more likely to spend more for this reason. Similarly, state governments that spend more might also exhibit larger cabinets. What factors might be relevant? For example, Berlin, Bremen, and Hamburg are city states, i. e. states that comprise a single city, whereas Bayern and Saxony are proper states comprising a large land area. Traditionally, political competition tends to be stronger within cities, leading to a relatively fragmented political landscape and consequently to a higher incidence of coalition governments. At the same time, it is generally accepted in Germany that the expenditure needs of the city-states are larger because of social problems caused by the greater anonymity in large urban areas (leading for example to more crime). Not controlling for whether a state is a city-state might therefore lead to biased estimates. Similarly, it appears from Figure 7 that the city states have on average larger cabinets than the other states. Again, this might be due to more intense political competition in the city states, forcing the government to create additional cabinet posts to pacify small but possibly influential groups. There might be other factors that affect the likelihood that a coalition government is formed or a large cabinet is chosen, notably cultural and historical differences with respect to the fiscal and political preferences of the population of the states.

As long as such (observed and unobserved) factors that might influence public expenditures, the likelihood of coalition governments, and the size of the cabinet are time-constant, they can be controlled for by including state fixed effects:

$$\text{Expenditures per cap.}_{i,t} = \alpha_i + \gamma_t + \beta_1 \text{Coalition government}_{i,t} + \beta_2 \text{Cabinet size}_{i,t}$$
$$+ \gamma \text{Expenditures per cap.}_{i,t-1} + \delta \mathbf{x} + \epsilon_i, \tag{4}$$

where α_i is a dummy variable that is 1 for state i.

It remains to be determined what estimation method to use for equation 4. The default estimator is OLS. However, OLS might result in inconsistent estimates for two reason. The first reason for this is that Model 4 is a dynamic panel data model with cross-section fixed effects. Estimating such a model with OLS results in the so called Nickell bias (Nickell, 1981).[16] Yet, the Nickell-bias approaches 0 with T. Judson and Owen (1999) show that with when $T = 30$, the bias of OLS can be effectively ignored, especially when interest is not centered around the estimate for the lagged dependent variable. My primary strategy to deal with the Nickell bias is therefore to use OLS estimator and to rely on the large-T properties of the dataset, which runs from 1975 to 2005 and consequently covers 31 years, to obtain consistent estimates. To check the robustness of this strategy, however, I also estimate the Model 4 with proper dynamic panel data estimators, notably the Arellano-Bond Difference-GMM estimator, the Blundell-Bond System-GMM estimator, and one variant of the Anderson-Hsiao estimator (Roodman, 2008a).

The second reason why OLS might be biased is because of potential reverse causality between the two types of government fragmentation and public expenditures. Moreover, despite the use of an extensive list of control variables and time and state fixed effects there may exist some unobservable factors that affect both public expenditures and electoral outcomes and through them the likelihood of coalition governments. To account for such factors, I will also report instrumental variables regressions, using the number of parties in parliament as instrument for the likelihood that a coalition government will be formed. Discussion on the strength and validity of this instrument is provided further below.

A potential reverse causality problem exists for the cabinet size variable. It is possible that governments increase the number of cabinet ministers if they intend to spend more. Unfortunately, it is difficult to construct a compelling instrument for this variable. The size

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[16]Note that estimating Model 4 with OLS is equivalent to within-transforming model 3 and then using OLS to estimate the within-transformed model. Consequently, the lagged dependent variable will be correlated with the error term in Model 4.

and composition of the cabinet size is determined by the parties involved in the government in a discretionary way and there is no institutional mechanism that could induce quasi-random over-time variation in cabinet size. This problem is common to studies that use data at some higher level of government, notably at the state or federal tier because these tiers of government have typically the political and legal power to determine their institutional structure at their own discretion.[17] As such, it must be assumed that there is no reverse causality in the over-time variation of cabinet size and public expenditures.

However, it is a reasonable assumption in the context of the German States that the over-time variation in cabinet size is not systematically influenced by planned changes in public expenditures. Anecdotal evidence suggests that state cabinets are primarily formed in view of political considerations. In particular, different wings of the parties that form the government have to be represented in the cabinet. For example, there is a more leftist and a more conservative wing in the SPD, and both wings are usually accommodated in some way in cabinets with SPD participation. Since many states are composed of different historical regions, geographical factors are important as well. For example, the state of Bavaria is divided in two parts, Bavaria proper and Franconia, and both have to be sufficiently represented in any CSU-led Bavarian cabinet. Consequently, political considerations are likely to trump attempts to structure the cabinet in view of expected public spending trajectories.

4   Baseline results

Baseline regressions of Equation 4 are reported in Table 1. For comparative purposes, this table consists of regressions with and without state fixed effects. The dependent variable

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[17]In contrast, many studies at the municipality level can rely on quasi-exogenous changes in institutional structures that are induced by regulations imposed by some higher tier of government. Pettersson-Lidbom (2012) and Egger and Koethenbuerger (2010), for example, use population thresholds for municipal legislature sizes to conduct regression discontinuity studies.

in all models is real expenditures per capita. I deflate public expenditures and all other nominal variables with the federation-wide CPI.

I test for first-order autocorrelation with a procedure used by Devereux et al. (2008). This procedure works as follows. First, the initial model is estimated. Then the residuals are calculated. Finally, the lagged residuals are included in the initial model as an additional control variable. If the lagged residuals are significant and positive, it is concluded that there is positive autocorrelation. If they are negative and significant, it is concluded that there is negative autocorrelation. The bottom of the regression tables always include the p-value of the hypothesis tests for the lagged error terms (in the row labeled AR(1) test).

Standard errors for hypothesis tests in Table 1 are robust to heteroscedasticity (tests (unreported) indicate heteroscedastic errors). Standard errors are also robust to first-order autocorrelation since the autocorrelation tests reported in Table 1 are generally rejected.[18]

The following variables are used as control variables: Revenues per capita, dummies indicating whether the government has a left or right ideology, the state unemployment rate, real GDP per capita, the share of the young (≤ 15 years) and old (≥ 65) in the state population, a state election year dummy, and the number of seats in the parliament (see Table A.2 for sources and specific definitions). Most of these variables are straightforward determinants of public expenditures. A few require additional explanation.

First, revenues per capita are included to control for available fiscal resources. Note that this variable is essentially exogenous from the perspective of the states. Rates cannot be

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[18]To account for autocorrelation, I use a kernel-based approach implemented in the ivreg2-command for Stata. I rely on the Bartlett-kernel with a bandwidth of 2, which is equivalent to Newey-West standard errors (Baum, 2005). I account for autocorrelation with the kernel-based approach rather than by clustering at the state-level because there are only 16 potential clusters and thus too few for reasonable estimation of clustered standard errors (Nichols and Schaffer, 2007). Moreover, clustered standard errors allow for arbitrary correlation within clusters. Consequently, hypothesis tests bases on clustered standard errors are relatively inefficient in the current context given that it is reasonable to assume that in the models reported below, errors are first-order autocorrelated. Hence, using standard errors that specifically control for this form of autocorrelation is clearly more efficient than clustering.

changed by the states for the most important taxes and transfers are distributed according to predetermined laws.

Second, ideological factors are likely to influence public expenditures. Because of multi-collinearity with the coalition dummy variable, I cannot include separate dummies capturing the ideology of each single or coalition government. I therefore aggregate different types of government and classify then as having either a left or right ideology. More specifically, I define a state government as having a left ideology if it is formed either by the SPD alone, by a SPD-Green Party coalition, or by a SPD-PDS coalition. Similarly, a state government is assumed to have a right ideology if it is formed by the CDU alone or by a CDU-FDP coalition. The reference category are the CDU-SPD and SPD-Green Party-FDP coalitions, as they include both one left and one right-wing party.

Finally, the state election year dummy is included to control for political business cycle effects. It is 1 in the year in which the election takes place, irrespective of whether the election takes place early or late in the year.

According to Table 1, the coefficient estimate for the coalition dummy and the cabinet size variable is consistently positive. When no state fixed effects are included both the coalition dummy and the cabinet size variables are statistically significant. According to Model II, coalition governments appear to spend on average 28 Euros per capita more than single-party governments. An increase of the cabinet by one member leads to an increase of about 7 Euros per capita. While statistically significant or almost significant, these values suggest rather minor economic effects of coalition governments and large cabinets. Average per capita expenditures in the German States was 4535 Euros. Thus, coalition governments spend only about 0.6% more than single-party governments. Similarly, an expansion of the cabinet by one member only results in an increase in per-capita expenditures by 0.2%.

As argued above, not including state fixed effects might result in biased estimates. Subsequent models (Models III-VI) therefore control for state fixed effects. Model III and IV

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include the coalition and cabinet size variables one at a time. The coalition dummy and the cabinet size variables display positive but insignificant effects in these models. Model V includes both the coalition dummy and the cabinet size variable jointly. The estimated coefficients for the coalition dummy variable is significant while the cabinet size variable is insignificant. Finally, Model VI includes the full set of control variables. The coefficients for the coalition dummy and the cabinet size variables, while positive, turns insignificant again. Numerically, the estimates for the coalition and cabinet size variables are even smaller than in the regression without the state fixed effects.

Even though the coefficients for the coalition dummy and the cabinet size variable are consistently positive, they tend to be numerically small, both in regressions with and without fixed effects. In the fixed effects regressions, both coefficients are insignificant as well once further control variables are included. On balance, these results suggest that coalition governments and large cabinets do not result in economically significant higher expenditures. Statistical significance is suspect, too.

5   Instrumental variables regressions

The previous regressions might suffer from an endogeneity problem because of unobserved omitted variables influencing both the likelihood of coalition governments and public expenditures *within* states. The robustness of the previous estimates can be checked through the use of an instrument for the likelihood that a coalition government will be formed.

The instrument I rely on is the number of parties in the state parliament. The fewer parties are represented in the state parliament, the easier it becomes to form a single-party government. The reason for this is the non-linearity in the formula that relates vote shares to seats in parliament at the five-percent hurdle. Parties with five percent of the votes receive about five percent of the seats in parliament. Parties with slightly less than five

percent receive no seats at all. Since the number of seats in the parliament is essentially fixed, the seats that would have accrued to the party that failed to enter parliament if there were no five-percent hurdle are given to the parties that actually are represented in parliament according to the latters' relative vote shares.[19]

For example, consider a parliament with 100 seats. To ensure a stable government, the parties involved must at least have 51 votes. Assume that there are four parties: A, B, C, and D. Party A has received in the election a vote share of 47% and party B a vote share of 44%. Now, if Party C and D each have 4.5% of the votes, they will not be allowed to enter parliament. Party A then receives $(47/91)\% \times 100 = 51$ of the seats wheras party B receives $(46/91)\% \times 100 = 49$. Party A can therefore form a stable single-party government.

Now consider a situation where party C receives in the election 5% of the votes whereas Party D receives 4%. Then, party C is allowed to enter parliament. Party A then receives $47/96\% = 49$ of the seats, party B $44/96\% = 46$ and party C $5/96\% = 5$. Thus, party A wil not be able to form a single-party government.

As this example illustrates, the number of parties in parliament will affect the ability of the CDU or the SPD to form a single-party government. The more parties can overcome the five-percent hurdle, the higher the probability that a coalition government will be formed. Therefore, the number of parties in parliament should be a strong instrument.

What about instrument validity? To be valid, the instrument should fulfill the exclusion restriction and the conditional independence assumption. Both the exclusion restriction and the conditional independence assumption are required to ensure that the instrument is not correlated with the error term, conditional on the control variables. The exclusion restriction implies in the current context that the the number of parties in the state parliament has only an effect on expenditures through its effect on the likelihood that a coalition

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[19]States use different formulas to map votes into seats (Hare-Niemeyer, d'Hondt, and Sainte-Laguë). Yet, they all strive to achieve proportionality between vote shares and seats in parliament of parties with more than five percent of the votes.

government will be formed. If this assumption is valid, the instrument can be excluded from the second stage regression. Validity of the independence assumption requires that the number of parties in parliament is not correlated with omitted variables that belong in the second stage regression.

There is no reason why the number of parties in parliament should affect public expenditures directly, i. e. the exclusion restriction should hold. First, since the opposition has no authority over fiscal policy, it does not matter of how many parties it is comprised of. Consequently, the fragmentation of the state parliament is irrelevant for public spending apart from its effect on the likelihood of coalition governments. Second, the number of seats in parliament is essentially fixed, and thus more parties in parliament will not result in higher expenditures because of the need to fund more representatives (see below for some details on this).

The conditional independence might be perceived as more problematic in the current context. It is possible to argue that voters with idiosyncratic but unobservables preferences regarding public expenditures might at the same time prefer more or less homogeneous parliaments. This may result in a correlation between the error term and the instrument in the second stage regression.

How likely is such a scenario? First, it demands that such unobserved preferences are state-specific and time-varying (given that the model I estimate controls for state and year fixed effects). Given the homogeneity of the German electorate and the existence of a common national media market, such state-specific developments are probably unimportant, and should to the extent that they exisit be picked up by the time-varying variables that are included in the model. Second, such a scenario would demand a great deal of coordination between voters with *different* ideological persuasions, i. e. between the left and the right of the political spectrum. For example, assume that a large fraction of FDP supporters decides in some election to vote for the CDU in order to make a coalition government less

likely. There will be some FDP supporters that always vote for the FDP, even if it has no chance of entering the parliament. But if the FDP does not enter the parliament, then these votes are lost for the right block. In such a situation, it is typically not rational for the supporters of the Green Party, the small party in the left block, to vote for the SPD, even if a majority of the Green Party supporters dislikes coalition governments. By voting for the Green Party, they can increase the likelihood of a left-wing government, since they help the Green Party to overcome the five-percent hurdle. As long as ideological preferences of the supporters of one small party outweigh their dislike for coalition governments (which arguably will be the case), it is rational from their perspective to vote for their preferred small party. Similarly, supporters of large parties have always an ideological incentive to vote for a small party, irrespective of their preferences regarding coalition governments. For example, it is claimed that supporters of the CDU sometimes vote for the FDP to help the latter to over-come the five-percent hurdle. Yet, it is also well known that they do so not because they prefer coalitions as such but because they realize that the CDU would not be able to form a government by itself.

The bottom line of this discussion is that ideological considerations will typically trump unobserved preferences for public spending when voters make their electoral choices. For such reasons, the independence assumption is reasonable for the parties in parliament instrument. The number of parties in parliament can therefore, conditional on the control variables, be treated as effectively random. This can be confirmed by a test proposed by Altonji et al. (2005a,b). According to these authors, a simple test to establish the validity of instruments is to observe how the coefficient estimates of the endogenous variable changes when additional control variables are concluded. If the results only change marginally, it may be concluded that the instrument induces quasi-random variation in the endogenous variable. The rationale underlying this argument is that if the results are robust to the inclusion of observable control variables, they are likely to be robust to unobservable control

variables as well. The second possibility to confirm the validity of the instruments is through over-identification tests. Even though I have only one primary instrument in the baseline TSLS regressions, I will experiment with additional instruments in a robustness check to be able to calculate over-identification tests.

Table 2 reports the instrumental variables regressions using Two Stage Least Squares. This table mostly replicates the models reported in Table 1. Model (I) includes the coalition dummy, the lagged expenditures per capita, and the year fixed effects. Model (II) adds the cabinet size variable. Model (III) the control variables already considered in Table 1.

Model (IV) adds a new control variable: the number of seats in parliament. The reason is this. As repeatedly mentioned above, the number of seats in parliament is *essentially* fixed. However, this also means that the number is not completely fixed. In some states, the existence of so called *Überhangmadate* and *Ausgleichsmandate* might lead to parliaments with more seats than the default number.[20] In practice, there are only a few *Überhang-* and *Ausgleichsmandate* in each election, if any. Still, not controlling for their existence could induce an omitted variable bias. Therefore, I control for the actual size of the parliament in Model IV.

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[20]The *Überhangmadate* and *Ausgleichsmandate* emerge in some states because of the attempt of the electoral laws in these states to combine elements of both proportional and plurality rule by means of the so called personalized proportional electoral system. In a particular variant of this electoral system, voters can cast two votes. With their first vote (*Erststimme*), they vote for a candidate within their voting district. With their second vote (*Zweitstimme*), they vote for a state party list. Seats in the state parliament are allocated to the parties in general according their shares in the *Zweitstimme*. The share of the *Zweitstimme* therefore basically defines the number of seats that should accrue to a party. In the allocation of seats, candidates who are directly elected in their districts are given primacy to candidates who are only on party list. That is, seats that belong to a party according to its share of the *Zweitstimme* are first filled with candidates who have won in their districts. Any remaining seats are filled with candidates that are on the party list (and have not won in their districts).

It can happen that the number candidates from a party who win in their districts exceeds the number of seats a state can claim according to its share of the *Zweitstimme*. Since it is not possible to deny a candidate who has won in his district a seat in parliament, the party gets a *Überhangmandat*, which increases the size of the parliament. Since this party has now more seats than it should get according to its *Zweitstimme*, the electoral laws in some states require that the other parties get so called *Ausgleichsmadate*. The purpose of the *Ausgleichsmandate* is to correct the imbalance in the distribution of seats introduced by the *Überhangmandate*. The *Ausgleichsmandate*, if they exist, increase the size of the parliament further.

The Kleinbergen-Paap F-Statistic in Models I-IV is around 30 or higher. The first stage regressions, reported in Table A.1 in the Appendix, show that the instrument affects the potentially endogenous variable in the expected way: the more parties are in parliament, the more likely are coalition governments. Note furthermore that the coefficient estimates for the coalition variable do not differ significantly between the models that include and those that omit additional control variables. In view of the test proposed by Altonji et al. (2005a,b), this indicates that the instrument is valid.

However, the estimates for the coalition variable differ to some extent from the baseline results reported in Table 1. The numerical values of the TSLS coefficient estimates for this variable are in general twice as large than the OLS estimates. However, as in the OLS regressions the coefficients are never significant at conventional significance levels, which reflects the relative inefficiency of TSLS compared to OLS.

Overall, while the numerical estimates are slightly larger, they continue to indicate that government fragmentation does not lead to significant common pool problems in the German States. Even ignoring the statistical insignificance of the estimates for the moment and taking the numerical estimates at face value, it can only be concluded that coalition governments spend around 44 Euros per capita more than single-party governments. That is, coalition governments spend about 1% more than single-party governments. Similarly, and increase in the cabinet size by one minister increases expenditures by 6 Euro per capita, about 0.1% of average expenditures.

In Table 3, I report in a number of robustness with alternative instruments, partly to check the robustness of the regressions with the number of parties in parliament instrument and partly to have the ability to calculate over-identification tests. These additional instruments are the actual vote share of the the FDP and the Green Party. Clearly, the larger the share of votes that these two parties get, the less likely it will be that a single-party government is formed. However, it is possible that these variables should not be

excluded from the second stage regression because *if* these two parties are actually part of the government, their vote share might have a direct effect on public expenditures (the conditional independence assumption is more suspect for these instruments than for the parties in parliament instrument).

Model I in Table 3 reports the result of a regression that replicates Model IV in Table 2, but uses the vote share of the FDP and the Green Party as instruments. Since two instruments are available for one endogenous variable, Hansen-J over-identification tests can be calculated. The test, reported at the bottom of the table, does not indicate that the instruments are invalid. The results with respect to the coalition dummy and the cabinet size variable are almost similar to those reported in the previous sections. Interestingly, these two variables are also strong instruments as indicated by the weak identification tests.

Model II replicates Model I by additionally including in the instrument set the number of parties in parliament. In this model, the Hansen-J over-identification test can be interpreted as a test for the validity of the parties in parliament instrument. The Hansen-J test is insignificant. The results for the coalition size and cabinet size variables are similar to those reported in the previous section. While the validity of the over-identificaiton tests relies on validity of at least on of the instruments, there is a reasonable chance that at least one of the instruments is valid. It is therefore reassuring that the over-identification tests are not rejected.

6 Robustness checks

One problematic feature of the estimates reported in the last section is the reliance of the large-T properties of the dataset to deal with the Nickell-bias. An alternative is to rely on dynamic panel data estimators that have been developed to address the problem of biased estimates in samples with small T. In this section, I report the results from

estimating Model 4 with three different dynamic panel data estimators: Difference-GMM, System-GMM, and Anderson-Hsiao.

The Difference-GMM estimator works as follows. First, Model 4 is written in first-differences. Then the model is estimated with GMM, using typically as many lagged levels of the dependent variable (starting from $t-2$) as available to instrument the first difference of the lagged dependent variable. The System-GMM estimator introduces an additional set of moment conditions involving Model 4 in its level form, and then uses first differences as instruments for these additional moment conditions.

One feature of the Difference and System-GMM estimators is that the number of instruments increases rapidly with the number of time periods, resulting in the so called "large instrument problem" and unreliable inference (Roodman, 2008b). Clearly, these estimators are designed for large-N-small-T datasets. Indeed Judson and Owen (1999) do not recommend the Difference- and System-GMM estimators with large T datasets.

According to Judson and Owen (1999), the Anderson-Hsiao estimator performs better than System-GMM and Difference-GMM in datasets with large T (albeit not as well than the simple fixed effects estimator). In contrast to the GMM-estimators, the number of instruments in the Anderson-Hsiao estimator is relatively small. This estimator also starts out by differencing Model 4. As instrument for the first difference lagged dependent variable, one variant of the Anderson-Hsiao estimator uses the second lag of the level.[21] The problem with the Anderson-Hsiao estimator is that it can be very inefficient if the second lag of the dependent variable is not strongly correlated with the first difference of the lagged dependent variable.

Table 4 reports the result of estimating Model 4 with the three panel data estimators. Model I reports the Difference-GMM regressions. Model II the System-GMM. Modell III

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[21]An alternative variant of the Anderson-Hsiao estimator uses the second lag of the first difference as instrument. I tried this variant as well, but the results were unreasonable and clearly suffered from weak instruments. Results are available upon request.

report the Anderson-Hsiao regressions using the second lag of the dependent variable as instrument.

In all models, I continue to use the number of parties in the state parliament as instrument for the coalition government dummy.

The coefficient for the coalition dummy is positive but insignificant in the GMM regressions. The numerical value of the estimate is 26 in the Difference-GMM model, it is somewhat larger in the System-GMM model with 72. Still, the results do not differ essentially from the results reported in the previous sections. The Anderson-Hsiao regression, too, produces a fairly large (78) but insignificant estimate for the coalition dummy. Note, however, that the weak-identification statistic is very low in this model. Further inspection of the first-stage results suggests that the small value of the test statistic can be explained by the fact that the second lag of the dependent variable is not significantly correlated with the first difference (the number of parties in parliament continues to be significantly and positively related to the likelihood that a coalition government will be formed).

Results for the cabinet size variable also do not differ significantly between the dynamic panel data models and the baseline results. The estimated coefficients are around 10 and insignificant.

In Table 5, I report a number of additional robustness checks. In Model I of this table, I estimate separate effects for the government fragmentation variables in West- and East-Germany. While the two parts of Germany have formally the same legislative structure, the East-German states operate in a somewhat different political and economic environment. One important political distinction is that the PDS plays a significant role in Eastern Germany. An economic distinction is the strong reliance on horizontal and vertical transfers of the East-German states. The results suggests, however, that the effects do not differ significantly between East- and West-Germany and are similar to those reported in the standard TSLS regressions.

In Model II and III, I use a West-German and a East-German subsample to estimate Equation 4, rather than estimating separate effects in these two states. Results regarding the coalition dummy and the cabinet size variable are similar, however.

In Model IV, I report regressions without Bavaria and Mecklenburg-Western Pomerania, as these two states have been ruled consistently by a single-party or by coalition governments. Results, however, are again almost identical to the baseline findings.

Model V reports regressions with an alternative coalition variable that takes the number of parties in the coalition into account. This variable is 1 for single party governments (since there is one party in government), 2 for all coalitions that included only two parties, and 3 for the SPD-FDP-Green Party coalitions that prevailed at different points in time in Brandenburg and Bremen and for the short-lived CDU-FDP-Schill Party coalition. The conclusions regarding the effect of coalition governments and cabinet size do not change.

7   Conclusion

The prevailing conclusion in the empirical literature of the fiscal consequences of government fragmentation is that coalition governments or large cabinets result in higher public expenditures. However, most studies exhibit some problematic features that put this conclusion into question. Cross-country studies have to cope with vastly differing institutional and cultural contexts. Studies at the sub-national level have mostly been conducted with data from fairly low levels of government, calling into question whether the results can be generalized to politically and economically powerful tiers. Finally, the study by Schaltegger and Feld (2009), while using data at the cantonal level and thus from the second highest tier of government in Switzerland, relies mostly on variation between cantons and does therefore not control for unobserved canton-specific effects.

This paper contributes to the literature by addressing each of these problematic features. Unlike cross-country studies, it uses variation from the institutionally and culturally homogeneous German States. Unlike studies at low levels of government, it focuses on the state and thus the second highest tier of government in Germany, a tier that is both politically powerful and fiscally important. Unlike the study by Schaltegger and Feld (2009), it can estimate meaningful fixed effects models because of the large within-variation in the incidence of coalition governments and the size of the cabinet and thus control for unobserved state-level heterogeneity.

Interestingly, the results in this paper differ from those found in most previous studies. The estimates suggest that neither coalition governments nor large cabinets result in significantly higher public expenditures. While the estimated effects for coalition governments generally exhibit a positive sign, they are numerically small and statistically insignificant once state fixed effects are included. Accounting for possible endogeneity in the incidence of coalition governments does not change this conclusion. Consequently, government fragmentation does not seem to lead to significant common pool problems in the German States.

On the one hand, this conclusion might be specific to Germany. It is possible that parliamentary control or other institutional features in the German States are sufficiently strong to check the incentives for fiscal profligacy that result from government fragmentation. The literature has emphasized for example the role of formal fiscal rules or the strength of the finance minister (Poterba, 1994; von Hagen and Harden, 1995). All German States have similar fiscal rules and all state finance ministers have similar institutional powers. It is possible that either the fiscal rules are effective in addressing common pool problems related to government fragmentation, or that the finance ministers are capable to force the cabinet ministers to internalize the full costs of targeted public expenditures.

On the other hand, this result might also indicate that the common pool problem is not as important for fiscal policy as suggested by the existing empirical literature. This is a reasonable interpretation of the results in this paper because it is difficult to imagine that countries will continue to suffer from common pool problems caused by government fragmentation without developing at some point mechanisms to limit its severity. Consequently, further research is required to establish whether the findings in this paper have external validity or whether they apply only to the German States.

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Table 1: THE EFFECT OF COALTION GOVERNMENTS AND CABINET SIZE ON REAL PUBLIC EXPENDITURES PER CAPITA, GERMAN STATES, 1975-2005, OLS ESTIMATIONS

	I	II	III	IV	V	VI
	b/z	b/z	b/z	b/z	b/z	b/z
Coalition government	26.401	27.870**	25.022		27.136*	12.826
	(1.513)	(2.211)	(1.591)		(1.729)	(0.903)
Cabinet size	18.502*	7.432		11.946	12.638	6.545
	(1.828)	(1.632)		(1.142)	(1.221)	(1.033)
Expenditures per cap.$_{t-1}$	0.956***	0.851***	0.695***	0.698***	0.696***	0.564***
	(36.036)	(26.116)	(5.460)	(5.537)	(5.560)	(12.166)
Revenues per cap.		0.187***				0.222***
		(5.085)				(5.922)
Left ideology		29.169				-4.955
		(1.446)				(-0.239)
Right ideology		15.313				-1.907
		(0.802)				(-0.098)
Unemployment rate		7.450*				-0.792
		(1.889)				(-0.173)
GDP per cap.		-0.000				0.008
		(-0.003)				(1.285)
Share of old		5.285				7.780
		(0.753)				(0.473)
Share of young		25.595***				48.539***
		(3.497)				(4.696)
Election year		23.907*				27.478**
		(1.687)				(2.179)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
State dummies	No	No	Yes	Yes	Yes	Yes
AR(1)-test (p-value)	0.017	0.035	0.029	0.027	0.023	0.142
N	395	379	395	395	395	379
F	473.325	610.682	447.578	465.122	454.698	692.948

[a] This table presents OLS regressions without and with state fixed effects.
[b] The dependent variable is real expenditures per capita.
[c] Stars indicate significance levels at 10% (*), 5% (**) and 1%(***).
[d] z-statistics in parentheses.
[e] z-statistics and hypothesis tests based on heteroscedasticity and autocorrelation robust standard errors.

Table 2: THE EFFECT OF COALTION GOVERNMENTS AND CABINET SIZE ON REAL PUBLIC EXPENDITURES PER CAPITA, GERMAN STATES, 1975-2005, TSLS ESTIMATIONS

	I b/z	II b/z	III b/z	IV b/z
Coalition government	58.201	66.184	43.217	44.358
	(1.095)	(1.249)	(0.934)	(0.937)
Cabinet size		13.634	5.710	5.838
		(1.326)	(0.940)	(1.017)
Expenditures per cap.$_{t-1}$	0.693***	0.694***	0.569***	0.569***
	(5.447)	(5.560)	(12.037)	(12.007)
Parliament size				-0.053
				(-0.092)
Year dummies	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes
Control variables	No	No	Yes	Yes
AR(1)-test (p-value)	0.041	0.038	0.216	0.221
N	395	395	379	379
F	440.148	432.239	665.675	649.023
Kleibergen-Paap Wald F-Statistic	39.645	38.212	26.778	29.388

[a] This table presents TSLS regressions: Model I includes only the coalition dummy, Model II adds the cabinet size variable, Model III adds control variables, Model IV additionally controls for the number of seats in the state parliament.

[b] The dependent variable is real expenditures per capita.

[b] Stars indicate significance levels at 10% (*), 5% (**) and 1%(***).

[c] z-statistics in parentheses.

[d] z-statistics and hypothesis tests based on heteroscedasticity and autocorrelation robust standard errors.

[e] The Cragg-Donald Wald F-Statistic is used to test for weak instruments.

[f] Control variables for which results are omitted are: Revenues per cap., Left ideology, Right ideology, Unemployment rate, GDP per cap., Share of old, Share of young, Election year.

Table 3: THE EFFECT OF COALTION GOVERN-
MENTS AND CABINET SIZE ON REAL
PUBLIC EXPENDITURES PER CAPITA,
GERMAN STATES, 1975-2005, TSLS
ESTIMATIONS, ALTERNATIVE INSTRU-
MENTS

	I	II
	b/z	b/z
Coalition government	43.184	44.279
	(1.175)	(1.208)
Cabinet size	5.534	5.510
	(0.931)	(0.928)
Expenditures per cap.$_{t-1}$	0.540***	0.540***
	(10.739)	(10.730)
Parliament size	-0.166	-0.167
	(-0.281)	(-0.282)
Year dummies	Yes	Yes
State dummies	Yes	Yes
Control variables	Yes	Yes
AR(1)-test (p-value)	0.267	0.270
N	343	343
F	554.160	554.380
Kleibergen-Paap Wald F-Statistic	22.377	15.752
Hansen-J	0.146	0.348

^a This table presents the TSLS regressions: Model I reports re-
gressions using the share of the Green Party and the FDP as
instrument, Model II reports regressions with the share of the
Green Party, the share of the FDP, and the number of parties
in parliament as instruments.

^b The dependent variable is real expenditures per capita.

^b Stars indicate significance levels at 10% (*), 5% (**) and
1%(***).

^c z-statistics in parentheses.

^d z-statistics and hypothesis tests based on heteroscedasticity and
autocorrelation robust standard errors.

^e The Cragg-Donald Wald F-Statistic is used to test for weak in-
struments.

^f Control variables for which results are omitted are: Revenues per
cap., Left ideology, Right ideology, Unemployment rate, GDP
per cap., Share of old, Share of young, Election year.

Table 4: THE EFFECT OF COALTION GOVERNMENTS AND CABINET SIZE ON REAL PUBLIC EXPENDITURES PER CAPITA, GERMAN STATES, 1975-2005, DYNAMIC PANEL DATA MODELS

	I	II	III
	b/z	b/z	b/z
Coalition government	26.704	71.965	82.447
	(0.485)	(0.915)	(0.395)
Cabinet size	12.774	11.705	9.342
	(1.104)	(1.383)	(0.950)
Expenditures per cap.$_{t-1}$	0.244*	0.752***	0.607
	(1.728)	(8.498)	(0.860)
Year dummies	Yes	Yes	Yes
Control variables	Yes	Yes	Yes
AR(1)-test (p-value)			0.867
N	363	379	363
χ^2	1951.564	1739.735	
F			16.010
Hansen-J	1.000	1.000	
GMM AR(1)-test (p-value)	0.001	0.021	
GMM AR(2)-test (p-value)	0.773	0.378	
Instrument-No.	69	69	0
Kleibergen-Paap Wald F-Statistic			0.638

[a] This table presents robustness checks using dynamic panel data estimators: Model I are Difference-GMM results, Model II are System-GMM results, Modell III are Anderson-Hsiao regressions with the second lag of the dependent variable as instrument for its first difference.

[b] The dependent variable is real expenditures per capita.

[c] Stars indicate significance levels at 10% (*), 5% (**) and 1%(***).

[d] z-statistics in parentheses.

[e] z-statistics and hypothesis tests based on one-step robust (Difference-GMM and System GMM regressions) or heteroscedasticity and autocorrelation robust (Anderson-Hsiao regressions) standard errors.

[f] Control variables for which results are omitted are: Revenues per cap., Left ideology, Right ideology, Unemployment rate, GDP per cap., Share of old, Share of young, Election year.

Table 5: THE EFFECT OF COALTION GOVERNMENTS AND CABINET SIZE ON REAL PUBLIC EXPENDITURES PER CAPITA, GERMAN STATES, 1975-2005, ROBUSTNESS CHECKS, TSLS ESTIMATIONS

	I	II	III	IV	V
	b/z	b/z	b/z	b/z	b/z
Coalition government		59.179	31.376	42.702	41.327
		(1.075)	(0.432)	(0.898)	(0.939)
Coalition government × West	46.849				
	(0.820)				
Coalition government × East	36.845				
	(0.592)				
Cabinet size		6.272	18.434	7.119	5.240
		(1.100)	(0.794)	(1.108)	(0.914)
Cabinet size × West	4.972				
	(0.815)				
Cabinet size × East	19.316				
	(0.895)				
Expenditures per cap.$_{t-1}$	0.563***	0.593***	0.096	0.584***	0.571***
	(11.232)	(10.635)	(0.990)	(11.714)	(11.823)
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes
AR(1)-test (p-value)	0.291	0.491	0.394	0.208	0.154
N	379	314	65	336	379
F	604.192	630.623	129.337	617.004	643.087
Kleibergen-Paap Wald F-Statistic	9.479	19.156	22.628	29.283	31.966

[a] This table presents robustness checks using TSLS: Modell I estimates separate effects of coalition governments and cabinet size in West- and East Germany, Modell II estimates the regression with a West-German subsample, Modell III estimates the regression with an East-German subsample, Modell IV estimates the regression after dropping Bavaria and Mecklenburg-Western Pomerania, Model V estimates the regression with a redefined coalition dummy.

[b] The dependent variable is real expenditures per capita.

[c] Stars indicate significance levels at 10% (*), 5% (**) and 1%(***).

[d] z-statistics in parentheses.

[e] z-statistics and hypothesis tests based on heteroscedasticity and autocorrelation robust standard errors.

[f] The Cragg-Donald Wald F-Statistic is used to test for weak instruments.

[g] Control variables for which results are omitted are: Revenues per cap., Left ideology, Right ideology, Unemployment rate, GDP per cap., Share of old, Share of young, Election year.
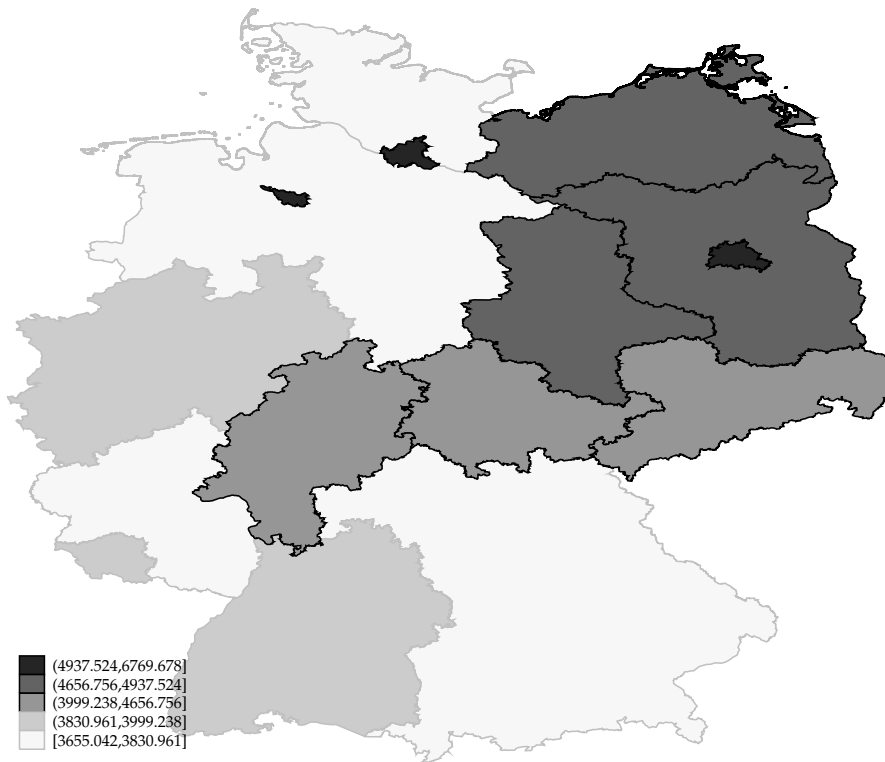
Figure 1: MAP OF THE 16 GERMAN STATES WITH AVERAGE REAL EXPENDITURES PER CAPITA DURING THE 1975-2005 PERIOD
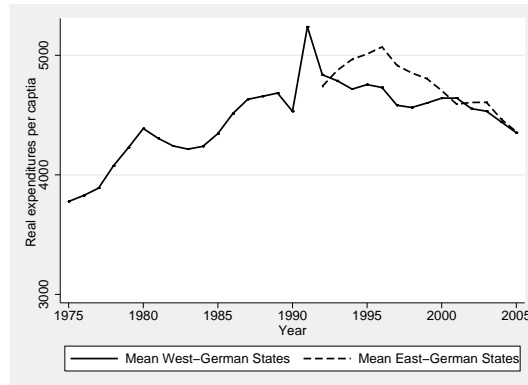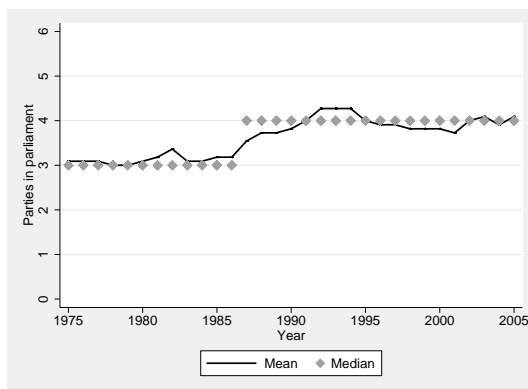
The legend shows the following categories:

- (4937.524,6769.678]
- (4656.756,4937.524]
- (3999.238,4656.756]
- (3830.961,3999.238]
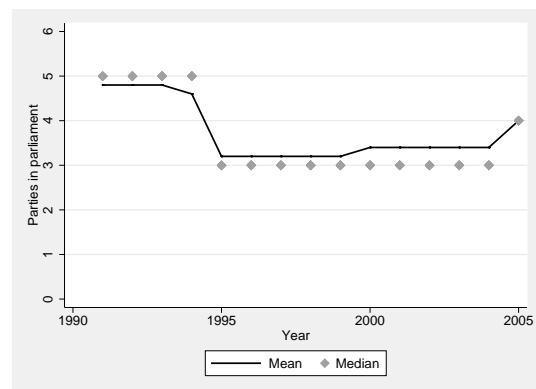- [3655.042,3830.961]

Figure 2: DEVELOPMENT OF (UNWEIGHTED) AVERAGE STATE EXPENDITURES PER CAPITA DURING THE 1975-2005 PERIOD

(a) NUMBER OF PARTIES IN PARLIAMENT IN WEST-GERMANY

(b) NUMBER OF PARTIES IN PARLIAMENT IN EAST-GERMANY

Figure 3: DEVELOPMENT OF THE NUMBER OF PARTIES IN WEST- AND EAST-GERMAN STATE PARLIAMENTS
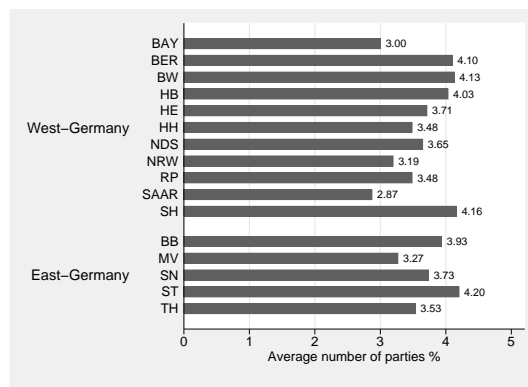
Figure 4: AVERAGE NUMBER OF PARTIES IN THE GERMAN STATE PARLIAMENTS DEFINITION OF THE STATE CODES: BAY (BAVARIA), BB (BRANDENBURG), BER (BERLIN), BW (BADEN-WUERTTEMBERG) HB (BREMEN), HE (HESSE), HH (HAMBURG), MV (MECKLENBURG-WESTERN POMERANIA), NDS (LOWER-SAXONY), NRW (NORTH RHINE-WESTPHALIA), RP (RHINELAND-PALATINATE), SAAR (SAARLAND) SH (SCHLESWIG-HOLSTEIN), SN (SAXONY), ST (SAXONY-ANHALT), TH (THURINGIA)
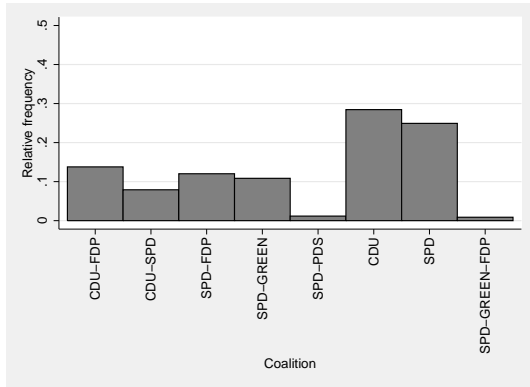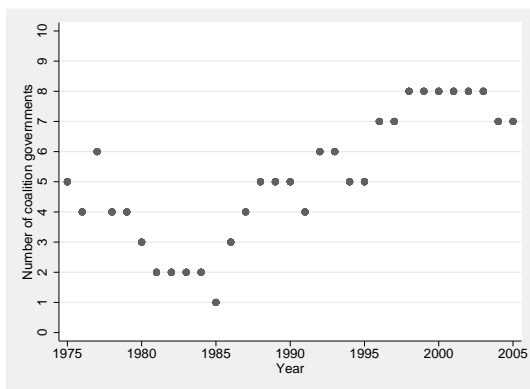
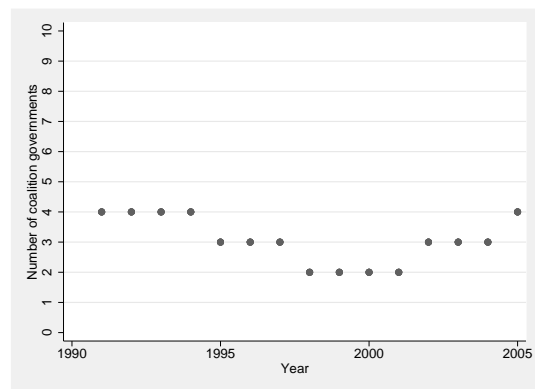**(a)** Coalitions and single-party governments in West-Germany
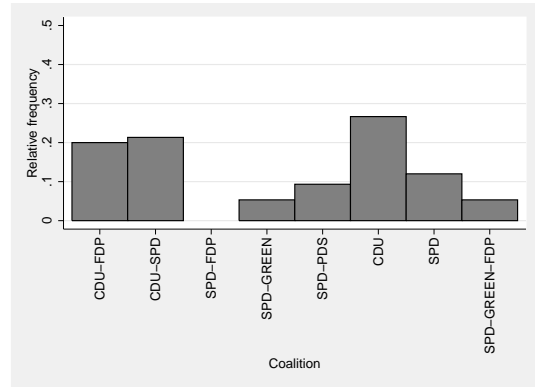
(b) Coalitions and single-party governments in East-Germany

Figure 5: Frequency of different types of government in West- and East-Germany

(a) Number of coalition governments in West-Germany

(b) Number of coalition governments in East-Germany

Figure 6: Over-time developments of the number of coalition governments in West- and East-Germany
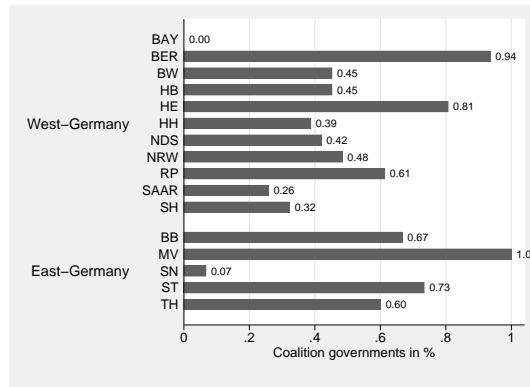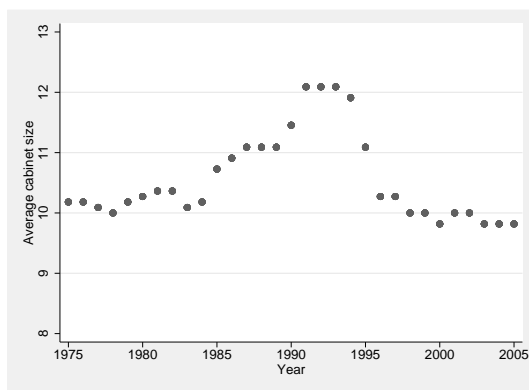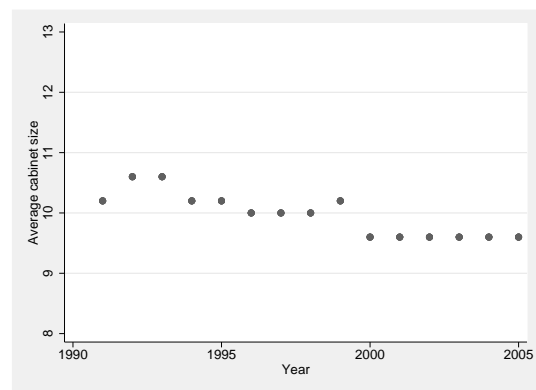
Figure 7: FREQUENCY OF COALITION GOVERNMENTS IN GERMAN STATES DEFINITION OF THE STATE CODES: BAY (BAVARIA), BB (BRANDENBURG), BER (BERLIN), BW (BADEN-WUERTTEMBERG) HB (BREMEN), HE (HESSE), HH (HAMBURG), MV (MECKLENBURG-WESTERN POMERANIA), NDS (LOWER-SAXONY), NRW (NORTH RHINE-WESTPHALIA), RP (RHINELAND-PALATINATE), SAAR (SAARLAND) SH (SCHLESWIG-HOLSTEIN), SN (SAXONY), ST (SAXONY-ANHALT), TH (THURINGIA)

(a) AVERAGE CABINET SIZE IN WEST-GERMANY

(b) AVERAGE CABINET SIZE IN EAST-GERMANY

Figure 8: DEVELOPMENT OF THE AVERAGE CABINET SIZE IN WEST- AND EAST-GERMANY
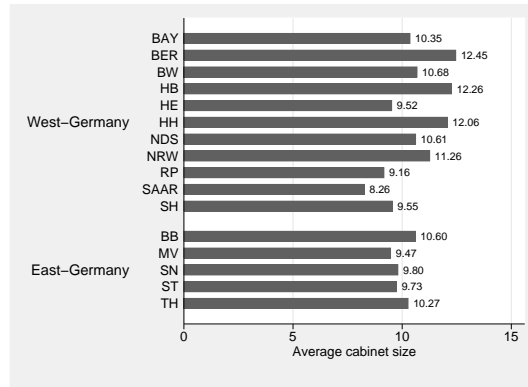
Figure 9: AVERAGE CABINET SIZE IN GERMAN STATES Definition of the state codes: BAY (Bavaria), BB (Brandenburg), BER (Berlin), BW (Baden-Wuerttemberg) HB (Bremen), HE (Hesse), HH (Hamburg), MV (Mecklenburg-Western Pomerania), NDS (Lower-Saxony), NRW (North Rhine-Westphalia), RP (Rhineland-Palatinate), SAAR (Saarland) SH (Schleswig-Holstein), SN (Saxony), ST (Saxony-Anhalt), TH (Thuringia)
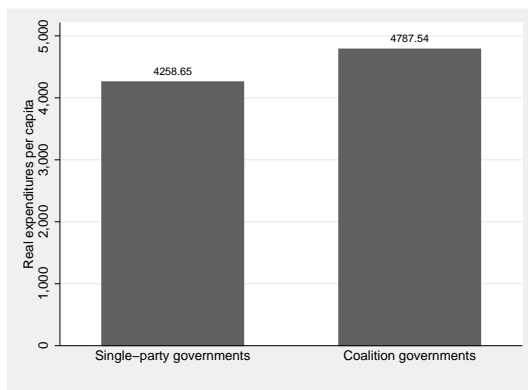
(a) COALITION GOVERNMENTS
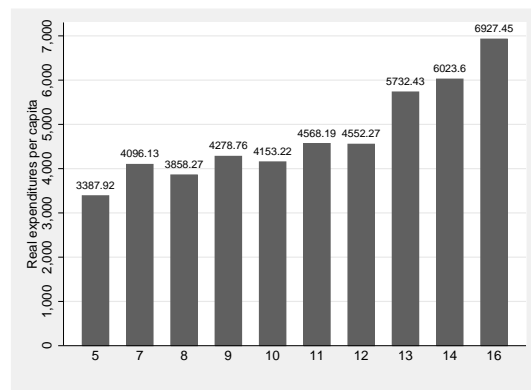
(b) CABINET SIZE

Figure 10: COALITION GOVERNMENTS, CABINET SIZE, AND AVERAGE PUBLIC EXPENDITURES IN THE GERMAN STATES, 1975-2005

Appendix

Table A.1: FIRST-STAGE REGRESSION OF COALITION GOVERN-MENTS ON PARTIES IN PARLIAMENT, GERMAN STATES, 1975-2005

	I	II	III	IV
	b/z	b/z	b/z	b/z
Parties in parliament	0.271***	0.269***	0.213***	0.227***
	(6.296)	(6.182)	(5.175)	(5.421)
Share of FDP				
Share of Green Party				
Cabinet size		-0.015	0.027	0.036
		(-0.719)	(1.258)	(1.561)
Expenditures per cap.$_{t-1}$	0.000	0.000	-0.000	-0.000
	(1.496)	(1.465)	(-0.719)	(-0.798)
Parliament size				-0.003
				(-1.417)
Year dummies	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes
Control variables	No	No	Yes	Yes
N	395	395	379	379
F	25.483	24.534	24.508	25.165

[a] This table presents the first-stage regressions for the regressions reported in Table 2.

[b] The dependent variable is whether a state is ruled by a coalition government.

[c] Stars indicate significance levels at 10% (*), 5% (**) and 1%(***).

[d] z-statistics in parentheses.

[e] z-statistics and hypothesis tests based on heteroscedasticity and autocorrelation and autocorrelation robust standard errors.

[f] Control variables for which results are omitted are: Revenues per cap., Left ideology, Right ideology, Unemployment rate, GDP per cap., Share of old, Share of young, Election year.

Table A.2: DEFINITION AND SOURCE OF VARIABLES

Label	Description	Source
Coalition government	Dummy variable = 1 if government is formed by a coalition of parties.	Own calculations based on www.tagesschau.de
Cabinet size	Number of ministers in the cabinet.	Own calculations based on Schnapp (2006) and information supplied by state governments or state parliaments.
Parties in parliament	Number of parties in the state parliament.	www.election.de
Expenditures per cap.	Real expenditures per capita (deflated by federal CPI). Expenditures are consolidated between states and their localities.	German Federal Statistical Office
Revenues per cap.	Real revenues per capita (deflated by federal CPI). Revenues are consolidated between states and their localities.	German Federal Statistical Office
Left ideology	Dummy = 1 if government is formed by left-leaning parties (i. e. for SPD, SPD-Green Party, and SPD-PDS governments).	Own calculations based on www.tagesschau.de
Right ideology	Dummy = 1 if government is formed by right-leaning parties (i. e. for CDU and CDU-FDP governments).	Own calculations based on www.tagesschau.de
Unemployment	State unemployment rate.	German Federal Agency of Employment
GDP per cap.	Real GDP per capita (deflated by federal CPI).	German Federal and State Statistical Offices (Arbeitskreis VGR der Länder)
Share of young	Share of "young" ($\leq$15 years) in state population.	German Federal Statistical Office
Share of old	Share of "old" ($\geq$65 years) in state population.	German Federal Statistical Office
Election year	Dummy = 1 if state election year.	Own calculations based on www.bundeswahlleiter.de
Parliament size	Number of seats in parliament.	German Federal Statistical Office

Table A.3: SUMMARY STATISTICS

Variable		Mean	Std. Dev.	Min.	Max.	N
Coalition government	overall	0.486	0.500	0.000	1.000	395
	between		0.276	0.000	1.000	16
	within		0.430	-0.447	1.409	24.688
Cabinet size	overall	10.463	1.715	5.000	16.000	395
	between		1.178	8.233	12.433	16
	within		1.201	6.030	14.030	24.688
Expenditures per cap.	overall	4535.074	1005.858	3179.434	7746.445	395
	between		881.297	3669.911	6788.286	16
	within		371.933	2500.945	5686.447	24.688
Parties in parliament	overall	3.625	0.788	2.000	6.000	395
	between		0.431	2.867	4.167	16
	within		0.658	1.959	6.087	24.688
Revenues per cap.	overall	4068.623	749.281	2733.402	6912.982	379
	between		633.408	3399.824	5395.368	16
	within		403.503	2587.733	5742.579	23.688
Left ideology	overall	0.367	0.483	0.000	1.000	395
	between		0.284	0.000	0.833	16
	within		0.395	-0.466	1.167	24.688
Right ideology	overall	0.420	0.494	0.000	1.000	395
	between		0.321	0.000	1.000	16
	within		0.387	-0.503	1.387	24.688
Unemployment rate	overall	10.566	4.897	2.100	22.100	395
	between		4.991	5.420	20.277	16
	within		2.680	2.332	19.932	24.688
GDP per cap.	overall	22732.070	6181.321	12498.730	43396.550	395
	between		5385.430	16078.390	36144.420	16
	within		3493.558	12633.130	29984.200	24.688
Share of old	overall	16.412	1.933	10.201	22.889	395
	between		1.077	14.880	18.587	16
	within		1.671	9.483	22.170	24.688
Share of young	overall	16.582	2.323	9.032	23.631	395
	between		1.391	14.353	18.286	16
	within		1.893	10.624	22.231	24.688
Election year	overall	0.238	0.426	0.000	1.000	395
	between		0.027	0.200	0.300	16
	within		0.425	-0.062	1.038	24.688
Parliament size	overall	125.370	49.497	50.000	241.000	395
	between		46.818	50.867	219.400	16
	within		13.246	89.970	198.970	24.688