DISCUSSION PAPER

// FRIEDRICH HEINEMANN AND JUSTUS NOVER

State-Owned Enterprises, Fiscal Transparency, and the Circumvention of Fiscal Rules: The Case of Germany

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State-Owned Enterprises, Fiscal Transparency, and the Circumvention of Fiscal Rules: The Case of Germany

Friedrich Heinemann[1, 2], Justus Nover[1, 3]

[1]ZEW Mannheim [2]University of Heidelberg [3]University of Mannheim

This version: November 2023

Abstract

State-owned enterprises (SOEs) provide opportunities for a more flexible and market-based provision of public services. At the same time, they may impair fiscal transparency and offer politicians discretion in the presence of strict fiscal rules if these only constrain the core budget. Using a comprehensive micro-data set of German SOEs, this paper studies a possible impact of the German debt brake on SOEs by tracking changes in financial indicators at the firm level that would hint to a circumvention of the rule. The identification exploits that the mounting compliance pressures over the lagged implementation of the debt brake from 2010 to 2020 differs across the 16 states. The results show that SOEs in fiscally more constrained states exhibit a stronger decrease in equity and reserves and a higher increase in debt compared to SOEs in less constrained states and the shorter the distance to the 2020 deadline. This result is based on a combined sample of state and municipal SOEs, a finding pointing towards the vertical spillover of a fiscal rule.

JEL codes: H10, H60, H74

Keywords: fiscal rules, extra budgets, Stability and Growth Pact

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1 Introduction

Fiscal rules are prone to circumvention. Unless the implementation of a budget rule is part of a more comprehensive institutional reform, it hardly changes the underlying causes for a debt bias (Alesina and Passalacqua, 2015). Hence, any such new constraint will naturally kick off a political search process for spending and debt opportunities outside of a rule's coverage. Even if, depending on the institutional set-up and a country's strength of the rule of law, politicians have a sound incentive to comply formally, they will likely strive to design workarounds that keep some of the old fiscal room of maneuver (Milesi-Ferretti, 2004).

In a general sense, the room for circumvention exists because fiscal targets like deficit, debt, or government spending indicators never perfectly measure the budget features that matter for government solvency (Milesi-Ferretti, 2004). A related defining characteristic of creative accounting is that any such measure improves the fiscal balance or reduces the public debt level but does not increase government net worth (Koen and van den Noord, 2005).

One important type of creative accounting in this sense is the relocation of spending from the core budget to off-budget entities. Currently, various prominent examples for this escape from the core budget are observable in Europe both at the national and the EU level. Germany had recently established the "Sondervermögen Bundeswehr" (a special fund established in 2022 for the German army) and massively expanded the *Klima- und Transformationsfonds* (Climate and Transition Fund dating back to 2011), which both finance significant public expenditures outside the restrictions of the country's constitutional debt brake. With respect to the Climate and Transition Fund, this flight from the budget was legally stopped with a ruling of the Federal Constitutional Court according to which this transfer of loans from the core budget to the Fund was an unlawful circumvention of the constitutional deficit ceiling and, therefore, void (Advisory Board to the Stability Council, 2022; Federal Constitutional Court, 2023, Bundesrechnungshof, 2023). However, similar extra-budgets were constructed at the subnational level of the German states and the EU level. The Next Generation EU fund's debt, for example, is not covered by the European debt rules although Member States receive the bulk of the fund's money (Heinemann, 2021).

Beyond those more prominent and large examples of special purpose funds, the universe of often smaller entities outside of the core budget, summarized under the term state-owned enterprises (SOEs), have always offered an interesting playground for budget cosmetics. Already in the list of early European circumvention measures of the 1990s and 2000s, as recorded by Koen and van den Noord (2005), financial relations with SOEs play a particularly prominent role. These SOE-related practices in those years comprised privatization (insofar they do not improve the efficiency of the corporation), one-time compensations paid by public corporations when transferring unfunded pension liabilities to the state, exceptional dividends, and a shift from direct public investment to investment by state-owned private companies.

So far, studies on fiscal rule circumvention through SOEs that makes use of SOE micro-data do not exist. The limited empirical literature on fiscal rule circumvention is largely based on aggregate budgetary data. In an early study, von Hagen and Wolff (2006) have found evidence that the deficit rule of the Stability and Growth Pact has induced governments to substitute deficits by stock-flow adjustments of the debt level. These adjustments may result from transactions in financial assets, including the acquisition of company assets, which do not show up in the deficit but in the debt figures. This stock-flow approach to detect budget cosmetics has become one of the popular methods in the literature since then.

Reischmann (2016) studies these suspicious stock-flow adjustments in the context of elections in OECD countries and concludes that they are more frequent before elections. Maltritz and Wüste (2015) find that stricter fiscal rules lead to higher stock-flow adjustments in OECD general government debt and deficit data. Koen and van den Noord (2005) and Alt et al. (2014) show how the Maastricht debt and deficit criteria induced EU governments to resort to one-off measures and creative accounting. Hirota and Yunoue (2022) apply the stock-flow approach to Japanese municipalities to illustrate how a new fiscal rule incentivizes creative accounting. Gootjes and de Haan (2022) follow an indirect strategy and show for national data that a low fiscal transparency understood as an incomplete coverage of public institutions in fiscal reporting leaves fiscal rules ineffective in improving the fiscal balance. Canova and Pappa (2006) demonstrate two types of rule circumvention for US states. States with tighter fiscal constraints use more non-guaranteed debt (that is not subject to deficit rules) than states with looser restrictions. Moreover, and closer related to our study, they notice a shift of public expenditure from the state to the local level for US states where the existing fiscal constraints only cover state budgets. In contrast, Burret and Feld (2018) do not find evidence for a vertical effect of a cantonal fiscal rule on municipal finances in Switzerland.

We contribute to the empirical literature on creative accounting induced by a fiscal rule with a focus on SOEs. Our contribution is innovative in several aspects. To the best of our knowledge, we are the first to provide a study on rule circumvention that is based on SOE micro-data.[1] By contrast, the existing literature largely rests on aggregate budgetary data to compare the flows (public deficit) with the changes in the stocks (public debt level). While this is a useful forensic method to detect budgetary cosmetics, its level of aggregation limits the potential insights. By contrast, our enterprise micro-data allow a finer-grained study of how SOEs are used by governments to comply with a new fiscal rule. Moreover, we introduce a new type of identification to the fiscal rule literature. We not only exploit federal variation in the context of the phasing-in of the German debt brake over the 2010s that put the 16 federal states under a mounting adjustment stress until they had to approach a balanced budget for the target year 2020. For our identification, we also make use of the fact that the adjustment pressure was

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[1] Boll and Sidki (2021) use the same micro-data on German SOEs as we do, but do not focus on fiscal rule circumvention. Instead, they examine whether political fragmentation in the council of the respective municipality that owns a local SOE affects SOE investment behavior. They find weak evidence for the veto player/war of attrition hypothesis, suggesting a negative effect of political fragmentation on SOE investment.

different across these federal states. Thus, we use the subnational variation in fiscal adjustment needs in combination with the phasing-in process to identify our effects.

Our results include some evidence for both debt relocation into and asset withdrawal from SOEs. With the debt brake's 2020 deadline approaching, SOEs in states with a higher adjustment pressure show relative debt increases and equity and reserve decreases. We do not find a differential effect on SOE profitability.

In the next section, we briefly describe the institutional setting with the phasing-in of the constitutional debt brake since 2009. Section 3 provides a description of the growth of the SOE sector in Germany over the period 2008-2019. Section 4 describes our hypotheses and our identification approach, followed by Section 5 with the results. Section 6 concludes.

2   The German debt brake and SOE-related circumvention

In 2009 Germany adopted a reform of its fiscal rules (for details: Federal Ministry of Finance, 2022). Before the reform, the constitution (*Grundgesetz*) included a "golden rule'' as the deficit could not exceed investment expenditure. However, a far-reaching and unspecified escape clause according to which exceptions were permissible to avert a "disturbance of the overall economic equilibrium" had left this rule ineffective. Following extensive discussions, the Federation and the *Länder* (states) agreed on a change of the *Grundgesetz*. The newly established rule, the so called "debt brake" was written into the constitution in 2009 but did not take full effect before the year 2020. Both the difficult state of public budgets in the aftermath of the financial crisis and the need to reach the required two-third majorities in both German parliamentary chambers explain this long implementation phase.

This prolonged phase of a lagged implantation defined a path with two different deadlines in the federation: the federal level had to comply with its new deficit threshold of 0.35% of GDP (for the structurally balanced budget) by 2016 whereas the states got four more years to reach a balanced budget by 2020. Only in times of natural disasters or exceptional emergency situations outside of government control can governments deviate from these deficit rules. For the years between 2010 and 2020, the states were not given a mandatory adjustment path. Five fiscally weaker states (Berlin, Schleswig-Holstein, Saxony-Anhalt, Saarland, and Bremen), however, were confronted with a particular constraint. In exchange for an annual special financial support ("consolidation aid") until 2019, they were obliged to cut back their 2010 deficit by at least 1/10 each year over this decade and were threatened with a loss of their consolidation aid otherwise. The long implementation lag with this heterogeneity of constraints across the states makes this set-up suitable to study possible circumvention activities of the states. We exploit this feature for our identification strategy.

Unlike the European fiscal rules of the Stability and Growth Pact, the German debt brake does not refer to the general government in total but – with the different thresholds and deadlines described – to the federal budget and the state budgets in isolation. Thus, the constitutional deficit rule does neither directly constrain the debt of the social security system nor of

municipalities. The rationale behind this approach is that these sub-sections are subject to their own constraints which, for the municipal level, amount to a golden rule where debt is only allowed to finance the formation of capital or to bridge short-term liquidity shortages through short-term loans (municipal short-term overdraft credits: *Kassenkredite*).

Moreover, in similarity to the European fiscal rules, the debt brake's constraints target in particular the governments' core budget and usually not SOEs that are "market producers'', i.e. who earn at least 50% of their revenues from sales of goods and services (details see Asatryan et al., 2022). SOEs are covered by the German debt brake only under restrictive conditions: they have to (i) lack own legal capacity (applies to so-called *Sondervermögen* and *Landes-/Bundesbetriebe*) and (ii) have received credit authority after 2010 (Reischmann, 2014; Feld et al., 2021; Deutsche Bundesbank, 2018).[2] At the level of the central government, this includes only few SOEs. At the level of the 16 states, the same rules as for the central government apply as long as states do not implement (more strict) own rules. As a result, some states like Baden-Württemberg, Bremen, or Rhineland-Palatinate also consider SOEs with own legal capacity in their debt brake calculations, but only under specific and restrictive conditions (e.g., Scholz, 2021). Given that the municipal level is not subject to the constitutional debt brake in general, none of the municipal SOEs are covered by the debt brake even if they fail to be market producers.

These institutional features highlight the potential of SOEs to be used as circumvention vehicles in the context of the German debt brake. Governments could try to shift deficits from core budgets into SOEs in order to formally comply with the constitutional rule. This could result through various channels. Public majority owners could direct their SOEs to take over less profitable or even loss-making service provisions that were formerly provided from core budgets; SOEs could be induced to take over the financing of public or semi-public infrastructure; SOEs could be forced to increase their dividend payments to the owner at the costs of falling cash and equity at the corporate level; related to the last argument, SOEs like utilities may be induced to make full use of their local market power in price setting in order to increase dividend payments to the municipality. Anecdotal evidence confirms that all those channels play some role in reality: On the provision of public goods, there are reports that street lights were sold to the local utility and the core budget subsequently had to pay a preferential price for the service provision; local SOEs often run semi-public infrastructure like town halls or leisure facilities (such as swimming pools) with prices below full cost coverage. A systematic overview of municipal consolidation measures in the state of North Rhine-Westphalia documents many SOE-related measures serving the purpose to consolidate the core budgets of fiscally distressed cities (gpaNRW, 2020). The list includes hundreds of measures taken over the period 2012 to 2018 by municipalities only in one state that either increased SOE dividend payments or cut back loss coverage to the SOEs. Some of the measures explicitly reduce the

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[2] EU fiscal rules, in contrast, do not rely on these two criteria. Instead, EU fiscal rules apply to Member States' core budgets as well as all non-market producer SOEs (i.e., those who earn less than 50% of their revenues from own sales), whereas SOEs categorized as market-producers are not covered.

SOE's equity (through a withdrawal of set-asides), while others motivate higher dividend payments by an increasing profitability of SOEs, resulting from higher fees.

As clarified, municipalities are not directly subject to the debt brake. In this respect, another institutional feature of fiscal federalism in Germany is relevant. German states are responsible to provide their municipalities with a sufficient financial capacity to fulfil their statutory tasks. For this purpose, German states fund municipal equalization schemes that provide assistance to municipalities that lack sufficient own revenues. Hence, states (constrained by the debt brake) could recourse to a circumvention strategy through underfunding their municipalities (not constrained by the debt brake). Moreover, states could shift expensive tasks to the municipal level without appropriate financial compensation. This shift of deficits to the municipal level could then be reflected by the municipalities passing on part of this additional fiscal pressure towards their SOEs with appropriate measures as described above. Municipalities might be forced to do so because of their own golden-rule type of institutional debt limit. Hence, there could well be an indirect effect of the federal debt brake on municipal SOEs even though the municipal sector is not directly subject to the rule. Therefore, in order to provide a comprehensive empirical assessment of SOE-related circumvention, municipal SOEs are included in part of our analysis.

The potential of SOEs to be used for creative accounting in Germany has been discussed in policy reports (Advisory Board to the Stability Council, 2022; German Council of Economic Experts, 2017) but has so far not been studied systematically. Our approach tries to assess the actual relevance through the exploitation of SOE micro-data. In the next step, we describe these data and present descriptive results for the growth of this sector over the last decade.

3   The SOE sector in Germany: Data and descriptives

We obtain our SOE micro-data from the annual accounts dataset provided by the Statistical Offices of the Federation and the Länder. It provides the annual balance sheets as well as the profit and loss statements of those SOEs in Germany insofar they apply commercial accounting standards. The exclusion of SOEs with cash accounting has no serious consequences for the comprehensiveness of this data source: Relative to the universe of German SOEs, the employed micro-data covers 82 percent in terms of the number of units and even 93 percent in terms of total SOE employment.[3] Cash accounting, and hence the exclusion from the database, is more typical for the so-called extra budgets that are non-market producers and, hence, more often covered by the debt brake.[4] Hence, our database provides a comprehensive picture for those SOEs that operate largely outside of the rules of the debt brake and, as a consequence, provide

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[3] For 2019, official sources list a total number of 23,123 SOEs, whereas the annual accounts dataset reports information on 19,009 SOEs in the same year (Federal Statistical Office, 2022a; 2022b). This implies a data coverage rate of 82.2 percent. In terms of SOE employment, coverage of the annual accounts dataset reaches 92.7 percent (Federal Statistical Office, 2022c).

[4] For 2019, the data shows that mostly SOEs categorized as extra budgets are underrepresented, whereas SOEs classified as other public funds, institutions, and enterprises (i.e., market producers) exhibit a data coverage rate of 93.6 percent (in terms of the total number of SOEs) and 96.4 percent (in terms of SOE employment).

particular potential for fiscal cosmetics from the perspective of core budgets. For the description in this section, we use in addition to the micro-data files also the aggregate figures provided by the Federal Statistical Office (2022d).

Figure 1 shows the level and growth in the number of SOEs for all three federal layers and the social security system.[5] The majority is owned by local governments which often outsource (public) tasks like energy and water provision, waste management, or social housing to SOEs.[6] There is a particularly pronounced increase in the number of SOEs owned by a local owner after 2015 which results in 26 percent more SOEs in 2019 compared to 2008 (Figure 1, Panel a). For SOEs with a state government owner, a similar pattern is observed. The increase at this government level is steadier and even results in 54 percent more SOEs in 2019 as compared to 2008 (Figure 1, Panel b). In contrast to these sharp increases, the number of SOEs with the central government as an owner is significantly smaller and more stable. The numbers also do not hint to an increase in the number of central government SOEs in and after 2016 when the debt brake became effective at the federal government level.[7]

Figure 1: Number of SOEs by government sector of the owner
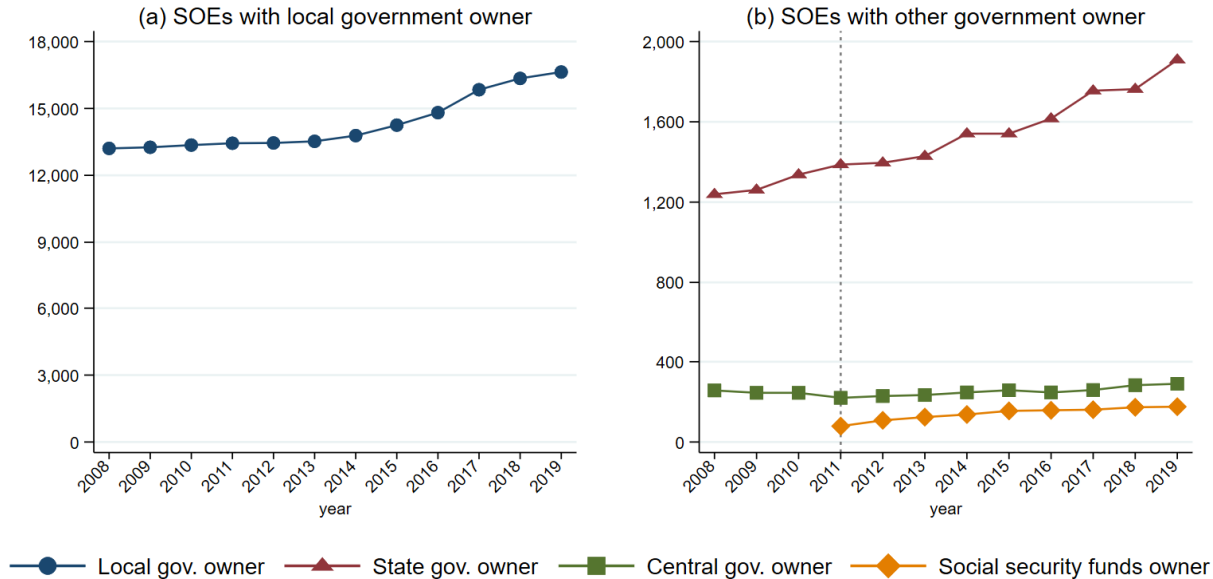
Notes: Before 2011 (indicated by the gray-dotted line in Panel (b)) the underlying data for SOEs with a state or central government owner also captures SOEs owned by social security funds. Source: Annual accounts data (macro-data files), own calculations.

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[5] The classification of SOEs according to their owner is only imperfectly covered by the annual accounts dataset due to a missing variable that is not made available to data users of the research data centers so that an approximation is applied which leads to a small classification error (details see Asatryan et al., 2022).

[6] The high number of SOEs also corresponds to the large number of more than 11,100 municipalities and districts in Germany (in 2019, Statistical Offices of the Federation and the Länder, 2022).

[7] This increase at the municipal and state level is no statistical artefact due to the inclusion of companies that switch from cash accounting to commercial accounting and therefore become available in the annual accounts database. Aggregate sectoral data from the Statistical Office for the universe of all SOE confirm a similar growth path.

This increase in the number of SOEs at the state and municipal level is not inconsistent with a debt brake circumvention that gained pace with the approaching 2020 deadline. However, it may equally signal a general trend where the local and state level outsources (public) tasks to publicly controlled enterprises in order to foster efficiency orientation and flexibility, for example, with respect to hiring, budget managements and wages.

In a next step, it is informative to look at state differences. If those states that face a particular fiscal constraint from the debt brake show an especially strong increase, this could be suggestive evidence for a debt cosmetic dimension in these developments. Figure 2 therefore plots the number of SOEs per 10,000 inhabitants per state – once including both local and state SOEs (Panel a) and once looking at the number of state SOEs only (Panel b). This heterogeneity analysis reveals two interesting results: First, area states from East Germany tend to have slightly more SOEs per capita than western area states[8] (but with exceptions, in particular Saarland). Second, growth rates in SOE numbers per capita (based on Panel (a)) are, however, significantly higher among the Western states (+31 percent) than among the Eastern states (+9 percent) over the period 2008-2019. Panel (b) confirms the difference in levels between East and West and reveals that the growth differential is even higher when only considering state SOEs (+32.1 percent in the East and +59.0 percent in the West) even though the patterns are somewhat veiled due to the scaling of the figure.[9]

As in most statistics, the three city states Berlin, Bremen, and Hamburg stand out in comparison to the area states. With no clear distinction between the local and state level in the city states, a comparison with the other states is only meaningful in the context of Panel (a) of Figure 2 which looks at the combined number of SOEs owned by local and state governments. Here, the city states rank low with a position among the area states with a small number of SOEs per capita but all three states experienced a strong growth in SOE numbers in the more recent years with particularly high increases for the consolidation-aid states Bremen and Berlin.

Figure 3 continues our analysis of the growth in SOE numbers and introduces our main treatment variable: *Consolidation-aid state*. This dummy takes the value 1 if the owner of an SOE belongs to the group of five states that received consolidation aid in the context of the introduction of the debt brake, according to a law from 2009 (*Konsolidierungshilfengesetz*). Recipients of consolidation aid were the five states Berlin, Bremen, Saarland, Saxony-Anhalt, and Schleswig-Holstein. These states received significant financial support but in return had to comply with a strict consolidation scheme to reduce public deficits early on (for details see next section). Figure 3 therefore differentiates between growth rates in the number of SOE in consolidation- versus non-consolidation-aid states and finds that growth rates are indeed larger

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[8] In 2019, area states from East Germany had 2.8 SOEs per 10,000 inhabitants, whereas area states from the West had 2.2 SOEs per 10,000 state inhabitants.

[9] Note that this pattern cannot be explained by municipalities from the Eastern states switching from cash to commercial accounting standards before the Western states and before the first year of the statistic as there were only four Western states which switched before 2010 (Christofzik, 2019). If mostly Eastern states were the first to adopt commercial accounting standards (likely causing their SOEs with a public legal form to do the same), this could explain why growth rates in SOE numbers of Western states picked up only later. However, the analysis in Christofzik (2019) suggests that this is not the case.

in those cases where clear consolidation targets for the core budget apply. This holds true regardless of whether we consider municipal and state SOEs combined (Panel a) or only focus on state SOEs (Panel b), though the difference in growth rates is much smaller in the latter case.

Figure 2: Number of SOEs per 10,000 inhabitants by state
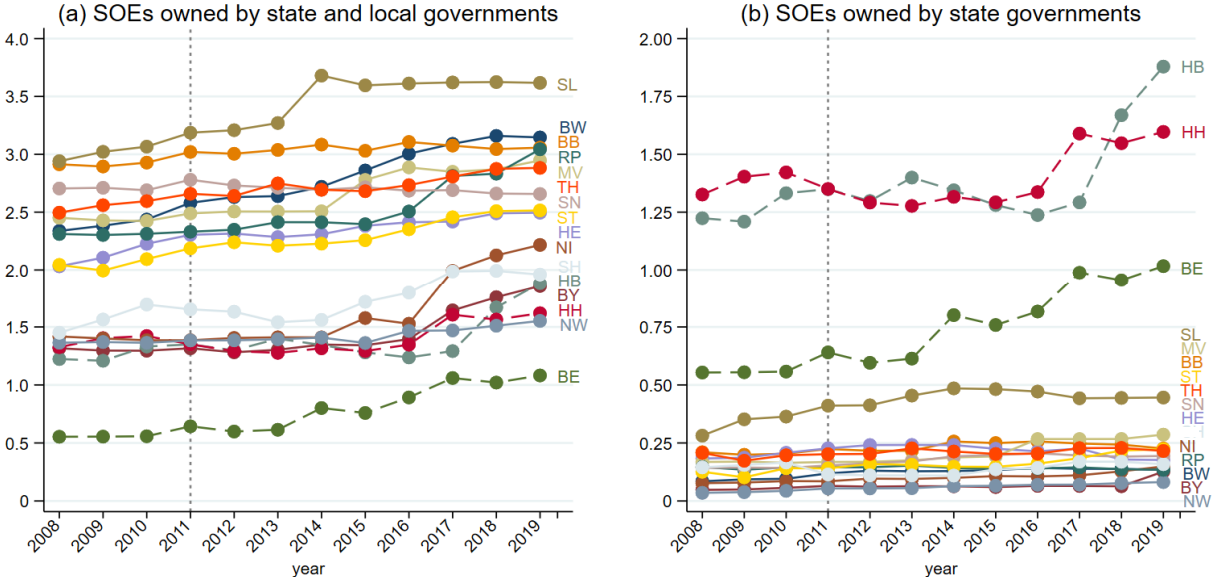
Notes: The figure only captures SOEs owned by local or state governments. Before 2011 (indicated by the gray-dotted line) the underlying data also captures some of the SOEs owned by social security funds (see discussion in Section 3.1). City states are indicated by dashed lines. State abbreviations: BW: Baden-Württemberg, NI: Lower Saxony, BY: Bavaria, NW: North Rhine-Westphalia, BE: Berlin, RP: Rhineland-Palatinate, BB: Brandenburg, SL: Saarland, HB: Bremen, SN: Saxony, HH: Hamburg, ST: Saxony-Anhalt, HE: Hesse, SH: Schleswig-Holstein, MV: Mecklenburg-Vorpommern, TH: Thuringia. Source: Annual accounts data (macro-data files), own calculations.

Figure 3: Growth rates for the per capita number of SOEs in consolidation- vs. non-consolidation-aid states (2008 to 2019)
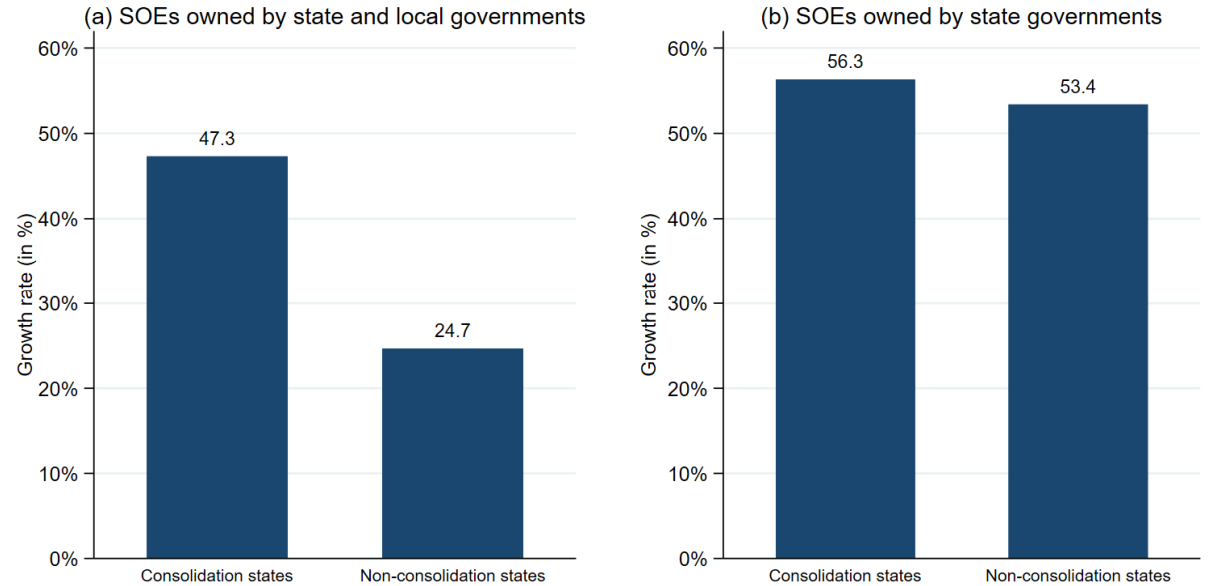
Notes: Consolidation(-aid) states: Berlin, Bremen, Saarland, Sachsen-Anhalt, Schleswig-Holstein. Growth rates over the period 2008 to 2019.

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We now turn our focus on the analysis of credit market debt held by SOEs. Figure 4 depicts the per capita debt of SOEs by state – again once looking at state and local SOEs combined (Panel a) and once looking at SOEs at the state level only (Panel b). In combination, the two subfigures support two conclusions: First, there is no clear East-West differential when it comes to debt held by SOEs as it was observable for the overall number of SOEs per capita. Second, city states, who own only few SOEs per capita in comparison to the area states when considering the total numbers by local and state governments (see Figure 2, Panel a), tend to have the highest per capita debt figures. This holds true in particular for Hamburg and Berlin, whereas the highly indebted state of Bremen ranks in the middle in comparison with all other 15 states but shows a marked increase. The correlation between per capita debt numbers for the core public sector and the SOE sector by state (looking at both the local and state level) is positive but low at 0.21 over the considered period 2008 to 2019.

Figure 4: SOE debt per capita by state (in EUR)
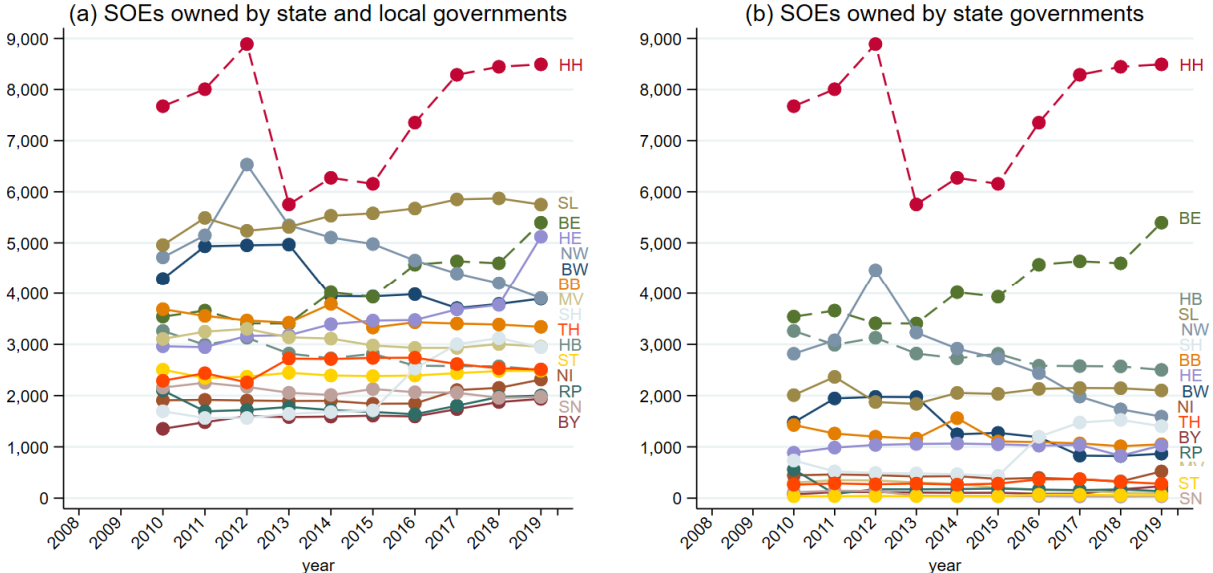
Notes: City states are indicated by dashed lines. Debt figures only capture debt held by the private sector (credit market debt) and ignores debt held by other government units. Source: Federal Statistical Office (2022e), own calculations.

Looking again at the differences between consolidation- and non-consolidation-aid states, Figure 5 shows that per capita SOE debt grew more slowly in states that did not receive fiscal consolidation aid prior to the introduction of the 2020 deadline at the state level. When only considering SOEs owned by states (see Panel b), SOE debt in per capita terms actually declined by 5.1 percent on average in non-consolidation-aid states, while it increased by 35.6 percent in states that received consolidation aid. This may be taken as additional descriptive evidence of creative accounting practices and calls for a more in-depth econometric analysis of the patterns identified.

Figure 5: Growth rates for per capita debt held by SOEs in consolidation- vs. non-consolidation-aid states (2010-2019)
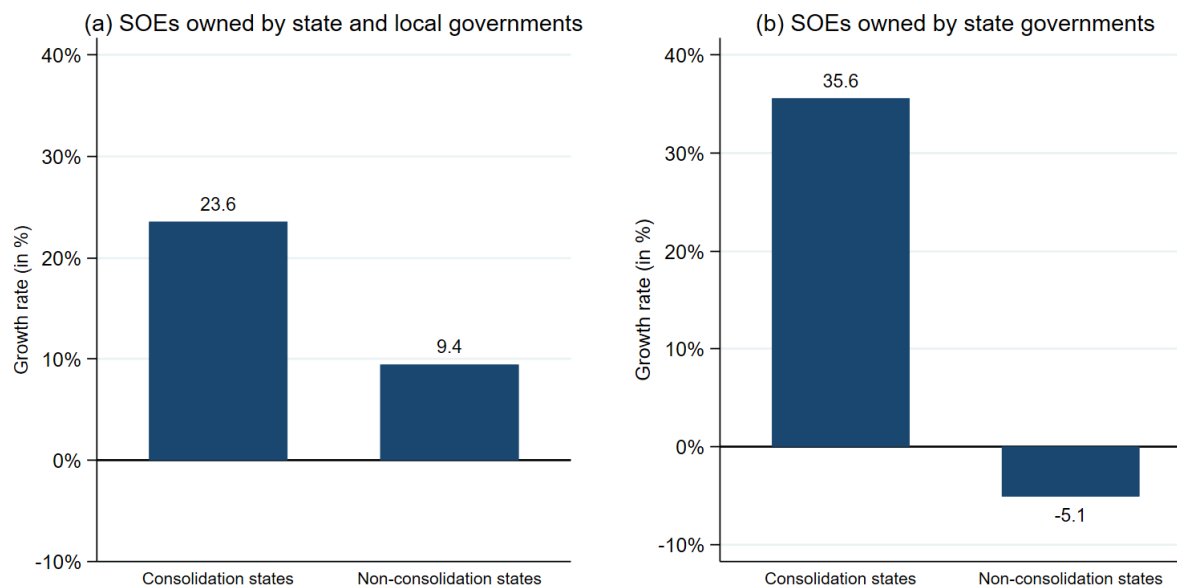
Notes: Consolidation(-aid) states: Berlin, Bremen, Saarland, Sachsen-Anhalt, Schleswig-Holstein. Growth rates over the period 2010 to 2019.

Figure 6 completes the descriptive analysis to compare the per capita levels of state and local government debt by state in 2019, once for the core budget and once including debt held by SOEs. On average, the inclusion of SOEs increases the per capita levels of debt by 3,380 euro or 44 percent. However, the implications of taking into account SOE debt vary widely across states. While in two states debt increases by less than 20 percent, in seven states it increases by more than 50 percent. The states that have received consolidation aid in the run-up to the full debt brake effectiveness (Berlin, Bremen, Schleswig-Holstein, Saxony-Anhalt, and Saarland) do not stand out in terms of divergence between both types of debt.

Overall, this descriptive evidence confirms that the SOE sector in terms of its size could be a potential instrument to reduce the salient burden of public debt. Indeed, SOE debt is substantial relative to the debt in core budgets. In addition, the strong growth of state and municipal SOEs during the debt brake's implementation phase is striking, although this trend is not paralleled by an equally dramatic increase in aggregate SOE debt. Across states, there is a weak correlation between public debt in the core budgets and in the SOE sector. However, these aggregate findings can hardly be taken as reliable evidence for a circumvention strategy where states under particular adjustment pressure from the constitutional fiscal rule would show a more aggressive build-up of SOE debt. For a more in-depth analysis, we therefore now turn to our empirical strategy to identify potential rule circumvention behavior using the micro-data.

Figure 6: Per capita credit market debt by state – State and local governments combined (in 2019)
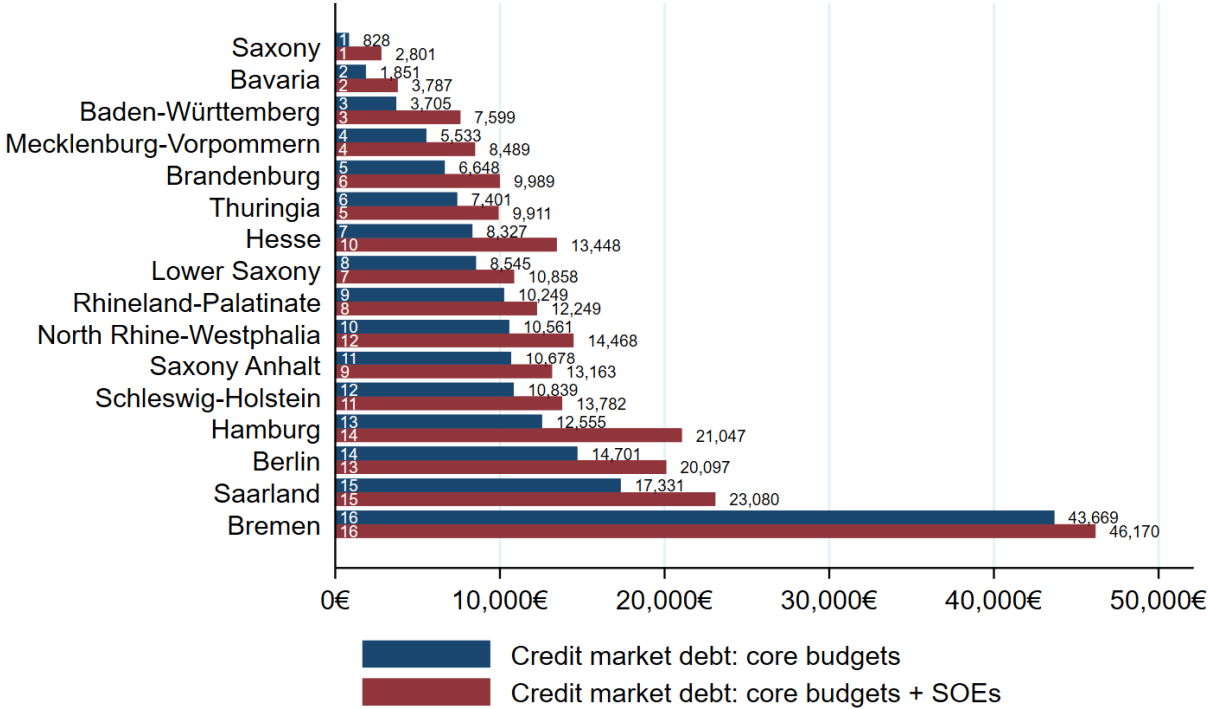
Notes: Debt figures only capture debt held by the private sector (credit market debt) and ignores debt held by other government units. The numbers in white denote the rank of the state when sorting states according to public debt levels from lowest to highest – highlighting that the ranking changes when excluding or including SOEs in the calculations. Source: Federal Statistical Office (2022e), own calculations.

4   Identification and estimation model

Our identification strategy follows a general message from the literature on budgetary cosmetics: When a fiscal rule becomes more binding, the recourse to gimmicks should become more pronounced (Koen and van der Noord, 2005). The lagged implementation of the German debt brake offers the necessary variance to test this prediction for the impact of a rule's implied constraint on suspicious SOE financial indicators. In particular, we exploit the mounting pressure from 2010 onwards with the approaching 2020 deadline (for the 16 states) for a balanced budget. This pressure varies across states as for some states the target of a balanced budget was significantly harder to achieve than for others, given the state of public finances in 2010. Our main "treatment" variable to capture this variance is the dummy variable (*Consolidation-aid state*) that distinguishes between states that received consolidation aid and those that did not, as described above. Most importantly for our analysis, these states had to comply with a strict consolidation scheme to reduce public deficits by 1/10 each year. Non-compliance was sanctioned by cancellation of all aid payments. This created clear incentives for policy makers to consolidate the core budget in each year over the period 2010 to 2019 and might have led to outsourcing to SOEs in order to meet the officially-defined consolidation targets.

As a robustness check, we also consider three additional treatment variables to take into account that also non-consolidation-aid states had to comply with the zero-deficit rule by 2020. Depending on the performance of public finances at the state level during the period 2010 to 2019, this goal was more or less ambitious to achieve for the states. We therefore also consider the following three variables in order to differentiate between consolidation pressures at the state level:

- *State deficit*: a dummy that is equal to 1 if the SOE's public owner runs a deficit, and 0 else[10];

- *Fiscally constrained*: a dummy that is equal to 1 if the owning state's per capita financial balance is below the median (of the entire sample), and 0 else;

- *Distance to balanced budget*: a censored continuous variable equal to 0 if the financial balance is larger than 0 (i.e., no adjustment need exists), and else it is equal to the per capita financial balance.

Our estimation model is the following:

$$Outcome_{i,t} = \alpha_0 + \beta Treatment_{i,t} + \gamma Pressure * Treatment_{i,t} + \alpha_i + \alpha_t + \theta' X_{i,t} + \varepsilon_{i,t}.$$

We model the (log of the) outcome variable as a function of *Pressure*, *Treatment*, and a matrix of control variables X. i and t denote the SOE and the time indicator. We include SOE (α_i) and year fixed effects (α_t).

Pressure is a categorical variable (2010: =1, ..., 2019: 10) that assumes a linearly mounting pressure approaching the implementation deadline. We interact this pressure variable with our main treatment variable (i.e., *Consolidation-aid state*) and, as a robustness check, the three additional treatment variables described above. Note that our *Pressure* variable is collinear with the year fixed effects and that there is no variation over time in the treatment dummy *Consolidation-aid state* such that we cannot estimate coefficients for these two variables.

Our controls X include (1) sales revenue, (2) sectoral NACE-code fixed effects, (3) legal form fixed effects, and (4) a dummy for a single public owner (as opposed to SOEs with multiple owners, e.g., for an inter-municipal company). Controls (1), (2), and (3) capture relevant firm characteristics like firm size, financial and legal independence, or the area of economic activity as not all SOEs are equally suitable to be used as circumvention vehicles. The fourth control variable takes into account that SOEs owned by a single public owner are likely better suited for manipulations compared to SOEs where multiple owners are involved in setting the agenda of the SOE. Through our set of SOE and time fixed effects, our identification refers to within SOE variance relative to the 2010 base year. Summary statistics for all variables are documented in Appendix Table A1.

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[10] If the SOE is owned by a local government, the deficit of the respective state is considered.

We consider four outcome variables at the SOE level: credit-market debt, equity, reserves, and return to capital.[11] Our expectation is that, with a tightening debt break constraint, we should observe the following movements for our outcome variables:

- increasing SOE debt because of a shift of debt-financed current spending and investment spending from core budgets to SOEs,

- falling SOE equity because governments shift net worth from SOEs to the core budget,

- falling SOE reserves because governments shift liquidity from SOEs to the core budget,

- falling SOE return to capital because governments induce SOEs to take over less profitable or loss-making services that were previously financed from the core budget.

With SOE and time fixed effects, our identification fully rests on within-SOE variance. In particular, we test whether an individual SOE changes behavior in states and years with more binding constraints compared to states and years with a fiscally more relaxed situation. This approach provides a conservative test for the prevalence of circumvention activities. It only studies, for example, a debt shift into existing SOEs and not the establishment of new SOEs for debt brake cosmetic purposes.

SOE firm dynamics through the emergence of new companies in our database leaves the sample unbalanced. New SOEs enter the dataset for either of two reasons: either they are newly established or they changed their accounting system towards commercial accounting so that they can be included in the annual accounts database. We deal with this issue by providing estimates both for an unbalanced sample (all observations) and a balanced sample (only including those SOEs that are observed over the entire sample period).

Finally, we study heterogeneous treatment effects in terms of the economic sector of the SOE (measured by NACE codes) by using a full triple interaction model. For this purpose, we identify six economic sectors where one might expect the largest outsourcing activities due to the type of services and goods produced in the respective sector.

5   Results

Table 1 summarizes our main results on the differentiation between consolidation- and non-consolidation-aid states. Our focus is on the coefficient γ, i.e., the coefficient for the interaction of the linear *Pressure* variable with the treatment indicator *Consolidation-aid state*. Table 1 reports results both for estimates restricted to state SOEs (Panel a) and for the combined sample of state and municipal SOEs (Panel b). One overriding result is that, irrespective of the considered outcome variable, a significant treatment impact is largely limited to estimations that use the full sample of state and municipal SOEs. Estimates based only on state data are not estimated with sufficient precision to be statistically significant at conventional levels. From a statistical perspective, this feature is not surprising given the much lower number of

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[11] We measure return to capital as profits/losses plus interest payments over fixed and current assets.

observations for state SOEs compared to the combined dataset and, hence, relates to the larger power of the combined sample. From a contents-wise perspective, this points towards an important feature of circumvention in federations. Interdependencies across federal layers may play a crucial role and circumvention incentives on a higher federal layer (the states in our context) can spill over to a lower federal layer (municipalities and their SOEs in our context).

The results consistently support a statistically significant difference in SOEs' financial developments between states that received consolidation aid and those that do not. As expected, state and municipal SOEs in consolidation-aid states show a larger SOE debt growth and a stronger decrease both in equity and reserves compared to SOEs in non-consolidation states the shorter the distance to the 2020 deadline (i.e., the interaction term). For the return-to-capital outcome variable, the sign is also as expected; return to capital declines faster in consolidation-aid states compared to non-consolidation-aid states for a lower distance to 2020. Yet, none of the coefficients for return to capital is statistically significant. All these findings hold both for the (larger) unbalanced panel and the (smaller) balanced panel. Thus, the results for our main treatment variable (*Consolidation-aid state*) are almost fully in line with the circumvention prediction.

Table 1: Effects of consolidation-state status on SOE outcomes

Panel (a): SOEs owned by state governments

	Credit-market debt (log)		Equity (log)		Reserves (log)		Return to capital	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Consolidation state*Pressure	-0.012	-0.005	0.013	0.012	-0.008	-0.008	-0.057	-0.112
	(0.029)	(0.031)	(0.010)	(0.012)	(0.011)	(0.012)	(0.092)	(0.102)
Constant	15.614***	15.644***	14.274***	14.498***	14.646***	14.755***	1.236	0.727
	(0.212)	(0.253)	(0.097)	(0.137)	(0.070)	(0.085)	(0.819)	(0.925)
Number of observations	3,731	2,569	14,212	9,438	9,750	7,009	14,890	9,772
Firm & year fixed effects	x	x	x	x	x	x	x	x
Control variables	x	x	x	x	x	x	x	x
Balanced panel		x		x		x		x

Panel (b): SOEs owned by state AND local governments

	Credit-market debt (log)		Equity (log)		Reserves (log)		Return to capital	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Consolidation state*Pressure	0.015**	0.018***	-0.009***	-0.010***	-0.009**	-0.010**	0.002	-0.004
	(0.006)	(0.007)	(0.003)	(0.004)	(0.004)	(0.004)	(0.033)	(0.034)
Constant	14.845***	14.961***	14.122***	14.385***	14.178***	14.295***	1.986***	1.756***
	(0.045)	(0.049)	(0.021)	(0.023)	(0.028)	(0.031)	(0.253)	(0.281)
Number of observations	86,924	72,889	150,628	116,051	115,731	94,204	156,644	119,710
Firm & year fixed effects	x	x	x	x	x	x	x	x
Control variables	x	x	x	x	x	x	x	x
Balanced panel		x		x		x		x

Notes: OLS regressions based on Equation (1). *Consolidation(-aid) state* is a dummy equal 1 if the respective state had to comply with fixed consolidation targets and in return received consolidation aid during the period 2010 to 2020 (i.e., Berlin, Bremen, Saarland, Sachsen-Anhalt, Schleswig-Holstein), 0 else. Control variables: sales revenue, sectoral NACE-code fixed effects, legal form fixed effects, and a dummy for a single public owner (as opposed to SOEs with multiple owners). Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

6 Robustness

Tables 2 to 4 report the results on our three additional treatment variables. While the results for our main treatment variable (*Consolidation-aid state*) are almost fully in line with the circumvention prediction (see Table 1), the results for the other three treatment indicators are more mixed.[12]

Starting with our alternative treatment indicator *State deficit*, the results presented in Table 2 support our hypotheses both for equity and reserves as outcome variables. Growth rates in SOEs' equity (reserves) are smaller if the respective state shows a deficit in a given year compared to SOEs where the home state does not run a deficit and when taking into account distance to the 2020 deadline in years. We do not find an effect on SOE debt or return to capital (the latter finding being in line with our main results from Table 1).

We draw the same conclusions for the results shown in Table 4, which considers the distance to a balanced budget on the yearly level as an alternative treatment variable (a censored continuous variable), while the results in Table 3 show a different pattern: Here, the dummy *Fiscally constrained* differentiates the observations based on whether the respective state's budget balance was below or above the median in a given year. According to the results, growth rates in SOEs' debt is larger if the respective state shows a budget balance below the sample median compared to SOEs where the home state is not as fiscally constrained and when taking into account distance to the 2020 deadline in years. The coefficients on SOEs' equity and reserves have the expected negative sign but are not statistically significant at conventional levels.

In sum, the circumvention hypothesis receives some support for SOE debt with significant coefficients and expected signs for two out of the four considered treatment variables. Moreover, for three out of the four treatment specifications, SOEs in fiscally more constrained states show a significantly larger decline in equity and reserves with the approaching 2020 deadline as compared to SOEs in less constrained states. The expected pattern is not supported for SOEs' return to capital, with many insignificant findings or, depending on the treatment specification, contradicting significant signs. These finding are robust no matter whether a balanced or unbalanced panel is used.

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[12] In this section, we focus our discussion of the results on the combined regressions, looking at state and municipal SOEs together, as we do not find any effects in the regressions that only consider SOEs owned by the states.

Table 2: Robustness check - effects of a state deficit on SOE outcomes

Panel (a): SOEs owned by state governments

	Credit-market debt (log)		Equity (log)		Reserves (log)		Return to capital	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State deficit	0.108	0.091	-0.036	-0.062	-0.009	0.004	1.131	1.519*
	(0.204)	(0.240)	(0.058)	(0.067)	(0.069)	(0.079)	(0.783)	(0.858)
State deficit*Pressure	-0.034	-0.019	0.001	0.003	-0.007	-0.009	-0.150	-0.227
	(0.039)	(0.046)	(0.012)	(0.015)	(0.013)	(0.015)	(0.168)	(0.179)
Constant	15.537***	15.578***	14.310***	14.554***	14.656***	14.756***	0.283	-0.519
	(0.270)	(0.316)	(0.102)	(0.138)	(0.093)	(0.110)	(1.094)	(1.227)
Number of observations	5,731	2,569	14,212	9,438	9,750	7,009	14,890	9,772
Firm & year fixed effects	x	x	x	x	x	x	x	x
Control variables	x	x	x	x	x	x	x	x
Balanced panel		x		x		x		x

Panel (b): SOEs owned by state AND local governments

	Credit-market debt (log)		Equity (log)		Reserves (log)		Return to capital	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State deficit	-0.054**	-0.043	0.038**	0.041**	0.043**	0.057***	-0.079	0.001
	(0.027)	(0.028)	(0.015)	(0.016)	(0.017)	(0.018)	(0.184)	(0.184)
State deficit*Pressure	0.008	0.007	-0.010***	-0.010***	-0.012***	-0.013***	0.009	-0.004
	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.037)	(0.037)
Constant	14.887***	14.994***	14.100***	14.356***	14.148***	14.255***	2.050***	1.758***
	(0.050)	(0.055)	(0.024)	(0.027)	(0.032)	(0.034)	(0.293)	(0.320)
Number of observations	86,924	72,889	150,628	116,051	115,731	94,204	156,644	119,710
Firm & year fixed effects	x	x	x	x	x	x	x	x
Control variables	x	x	x	x	x	x	x	x
Balanced panel		x		x		x		x

Notes: OLS regressions based on Equation (1). *State deficit* is a dummy equal 1 if the respective state had a (structural) deficit in a given year, 0 else. Control variables: sales revenue, sectoral NACE-code fixed effects, legal form fixed effects, and a dummy for a single public owner (as opposed to SOEs with multiple owners). Robust standard errors in parentheses. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 3: Robustness check - effects of a fiscally more constrained financial situation at the state level on SOE outcomes

Panel (a): SOEs owned by state governments

	Credit-market debt (log)		Equity (log)		Reserves (log)		Return to capital	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fiscally constrained	0.169	0.166	-0.065	-0.094	-0.023	-0.015	1.322**	1.704**
	(0.168)	(0.195)	(0.050)	(0.059)	(0.063)	(0.073)	(0.659)	(0.763)
Fiscally constrained*Pressure	-0.034	-0.032	0.012	0.015	0.003	-0.001	-0.139	-0.177
	(0.028)	(0.033)	(0.008)	(0.010)	(0.010)	(0.012)	(0.112)	(0.127)
Constant	15.476***	15.516***	14.332***	14.576***	14.663***	14.767***	0.095	-0.726
	(0.269)	(0.313)	(0.106)	(0.145)	(0.089)	(0.106)	(1.024)	(1.168)
Number of observations	3,731	2,569	14,212	9,438	9,750	7,009	14,890	9,772
Firm & year fixed effects	x	x	x	x	x	x	x	x
Control variables	x	x	x	x	x	x	x	x
Balanced panel		x		x		x		x

Panel (b): SOEs owned by state AND local governments

	Credit-market debt (log)		Equity (log)		Reserves (log)		Return to capital	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fiscally constrained	-0.070***	-0.047*	0.012	0.015	0.014	0.027	-0.127	-0.152
	(0.026)	(0.195)	(0.014)	(0.015)	(0.017)	(0.018)	(0.165)	(0.166)
Fiscally constrained*Pressure	0.012***	0.008**	-0.001	-0.002	-0.002	-0.004	0.005	0.020
	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.003)	(0.024)	(0.024)
Constant	14.901***	14.998***	14.112***	14.372***	14.166***	14.273***	2.094***	1.877***
	(0.050)	(0.055)	(0.025)	(0.027)	(0.032)	(0.034)	(0.289)	(0.312)
Number of observations	86,924	72,889	150,628	116,051	115,731	94,204	156,644	119,710
Firm & year fixed effects	x	x	x	x	x	x	x	x
Control variables	x	x	x	x	x	x	x	x
Balanced panel		x		x		x		x

Notes: OLS regressions based on Equation (1). *Fiscally constrained* is a dummy equal 1 if the respective state in a given year had a (structural) financial balance below the median of all German states over the period 2010 to 2019, 0 else. Control variables: sales revenue, sectoral NACE-code fixed effects, legal form fixed effects, and a dummy for a single public owner (as opposed to SOEs with multiple owners). Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

Table 4: Robustness check - effects of the distance to ta balanced budget at the state level on SOE outcomes

Panel (a): SOEs owned by state governments

	Credit-market debt (log)		Equity (log)		Reserves (log)		Return to capital	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance to balanced budget	0.013	0.010	0.005	0.002	0.011	0.011	0.065	0.078
	(0.027)	(0.030)	(0.010)	(0.011)	(0.010)	(0.011)	(0.115)	(0.123)
Dist. budget balance*Pressure	-0.005	-0.006	-0.001	-0.002	0.001	0.001	-0.004	0.012
	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.033)	(0.029)
Constant	15.571***	15.617***	14.260***	14.499***	14.597***	14.704***	0.959	0.333
	(0.243)	(0.289)	(0.101)	(0.138)	(0.084)	(0.100)	(1.001)	(1.114)
Number of observations	3,731	2,569	14,212	9,438	9,750	7,009	14,890	9,772
Firm & year fixed effects	x	x	x	x	x	x	x	x
Control variables	x	x	x	x	x	x	x	x
Balanced panel		x		x		x		x

Panel (b): SOEs owned by state AND local governments

	Credit-market debt (log)		Equity (log)		Reserves (log)		Return to capital	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance to balanced budget	-0.018**	-0.019**	0.010**	0.010**	0.009*	0.011**	-0.071	-0.074
	(0.009)	(0.009)	(0.005)	(0.005)	(0.005)	(0.005)	(0.053)	(0.054)
Dist. budget balance*Pressure	0.002	0.002	-0.002**	-0.002**	-0.002***	-0.003***	0.012	0.015
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.010)	(0.010)
Constant	14.879***	14.997***	14.103***	14.367***	14.163***	14,276***	2.114***	1.880***
	(0.049)	(0.053)	(0.023)	(0.025)	(0.030)	(0.032)	(0.277)	(0.304)
Number of observations	86,924	72,889	150,628	116,051	115,731	94,204	156,644	119,710
Firm & year fixed effects	x	x	x	x	x	x	x	x
Control variables	x	x	x	x	x	x	x	x
Balanced panel		x		x		x		x

Notes: OLS regressions based on Equation (1). *Distance to balanced budget* is a censored continuous variable equal to zero if the state had a positive (structural) financial balance in a given year and equal to the per capita (structural) deficit if the financial balance was negative in a given year. Control variables: sales revenue, sectoral NACE-code fixed effects, legal form fixed effects, and a dummy for a single public owner (as opposed to SOEs with multiple owners). Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

7 Heterogeneities by economic sectors

Table 5 shows the results of our heterogeneity analyses based on the NACE-classification of each SOE into economic sectors. The results for our four different treatment variables based on separate regressions are shown in the four different panels: Panel (a) – *Consolidation-aid state*, Panel (b) – *State deficit*, Panel (c) *Fiscally constrained*, and Panel (d) – *Distance to budget balance*. We expect to see strong effects in sectors of the economy where the public sector is often involved and which are more amenable to outsourcing from core budgets than other sectors. In particular, we explicitly consider the effects in the following six NACE sectors: D (electricity, gas, steam and air conditioning supply), E (water supply, sewerage, waste management), F (construction), L (real estate activities), Q (human health and social work activities), and R (arts, entertainment and recreation).[13]

For SOE debt, we find a relatively strong positive effect only in sector D (electricity, gas, steam and air conditioning supply) which appears to drive the overall positive effect in the previous tables. This sector largely represents the sector of municipal utilities. SOEs in this economic sector and from fiscally more constrained states experience a stronger increase in debt with the approaching 2020 deadline than SOEs in less constrained states and operating in other economic sectors. This finding is confirmed not only for our main treatment variable *Consolidation-aid state* but holds true also for the two other treatment indicators *State deficit* and *Fiscally constrained*. The respective effect for the fourth treatment variable (*Distance to budget balance*) is also positive but not statistically significant at conventional levels.

For the other two outcome variables equity and reserves, for which we identified significant negative effects in the main tables, the heterogeneity analyses are more mixed. The regressions based on our main treatment variable (*Consolidation-aid state*) suggests that the overall negative effects from Table 1 are not driven by SOEs in one of the separately considered economic sectors. Instead, the negative effects for the *Consolidation-aid state*Pressure* interactions remain statistically significant at the 5 and 10 percent level respectively also in the heterogeneity analyses. The three alternative treatment variables partly identify stronger effects for the utilities sector D (electricity, gas, steam and air conditioning supply), for R (arts, entertainment and recreation), and F (construction). In particular, the relatively stronger effects in sector D are consistent with the findings on SOE debt as an outcome variable discussed above, and suggest that SOEs providing their services in the area of electricity, gas, or steam and air conditioning supply are responsible for a significant share of the identified patterns. This is perhaps not so surprising given that a relatively large share of SOEs operate in this sector (i.e., many local governments own local utilities), making them not only an attractive but also a widely available tool for the potential use of creative accounting practices.

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[13] The heterogeneity analysis by NACE codes focuses on (i) the unbalanced sample, as this aspect does not seem to have a relevant impact on the results, but the unbalanced sample offers more variation, and (ii) the combined sample of both state and municipal SOEs.

Table 5: Effects of fiscal conditions at state level on SOE outcomes by economic sector

	Credit-market debt (log)	Equity (log)	Reserves (log)	Return to capital
	(1)	(2)	(3)	(4)
Panel (a)				
Consolidation state*Pressure	0.005	-0.012**	-0.012*	0.019
	(0.015)	(0.006)	(0.007)	(0.062)
Consolidation state*Pressure*NACE_D	0.050**	-0.002	0.019	-0.041
	(0.023)	(0.011)	(0.015)	(0.079)
Consolidation state*Pressure*NACE_E	0.027	0.004	0.000	-0.001
	(0.019)	(0.007)	(0.008)	(0.070)
Consolidation state*Pressure*NACE_F	-0.040	0.022	-0.000	-0.191
	(0.033)	(0.039)	(0.022)	(0.230)
Consolidation state*Pressure*NACE_L	-0.009	0.000	-0.005	-0.113
	(0.018)	(0.012)	(0.012)	(0.095)
Consolidation state*Pressure*NACE_Q	0.006	0.028**	0.009	0.251
	(0.032)	(0.014)	(0.019)	(0.166)
Consolidation state*Pressure*NACE_R	-0.006	-0.002	0.001	-0.157
	(0.031)	(0.016)	(0.014)	(0.190)
Panel (b)				
State deficit*Pressure	-0.004	-0.006	-0.013**	0.025
	(0.012)	(0.004)	(0.005)	(0.062)
State deficit*Pressure*NACE_D	0.039***	-0.018***	-0.002	-0.090
	(0.015)	(0.007)	(0.008)	(0.079)
State deficit*Pressure*NACE_E	0.015	0.000	0.004	0.027
	(0.012)	(0.005)	(0.006)	(0.060)
State deficit*Pressure*NACE_F	-0.010	-0.024	-0.012	0.067
	(0.028)	(0.017)	(0.014)	(0.151)
State deficit*Pressure*NACE_L	0.008	0.010*	0.010	-0.053
	(0.013)	(0.006)	(0.006)	(0.086)
State deficit*Pressure*NACE_Q	0.022	-0.002	0.009	-0.059
	(0.019)	(0.008)	(0.009)	(0.119)
State deficit*Pressure*NACE_R	0.025	-0.024**	-0.012	0.051
	(0.021)	(0.011)	(0.011)	(0.147)
Firm & year fixed effects	x	x	x	x
Control variables	x	x	x	x

Table continues on next page.

Table 5 continued.

	Credit-market debt (log)	Equity (log)	Reserves (log)	Return to capital
	(1)	(2)	(3)	(4)
Panel (c)				
Fiscally constrained*Pressure	0.002	0.004	-0.003	-0.013
	(0.011)	(0.003)	(0.004)	(0.045)
Fiscally constrained*Pressure*NACE_D	0.029**	-0.007	0.012*	0.017
	(0.014)	(0.006)	(0.007)	(0.059)
Fiscally constrained*Pressure*NACE_E	0.015	-0.007*	-0.002	0.014
	(0.011)	(0.004)	(0.005)	(0.048)
Fiscally constrained *Pressure*NACE_F	0.004	-0.044***	-0.016	0.063
	(0.029)	(0.015)	(0.013)	(0.150)
Fiscally constrained *Pressure*NACE_L	0.003	0.004	0.011**	-0.012
	(0.012)	(0.005)	(0.005)	(0.064)
Fiscally constrained *Pressure*NACE_Q	0.003	-0.004	0.003	0.089
	(0.016)	(0.007)	(0.007)	(0.087)
Fiscally constrained *Pressure*NACE_R	0.024	-0.025***	-0.020*	0.113
	(0.020)	(0.010)	(0.011)	(0.126)
Panel (d)				
Dist. budget balance*Pressure	0.002	-0.002	-0.001	0.030
	(0.003)	(0.001)	(0.002)	(0.019)
Dist. budget balance*Pressure *NACE_D	0.007	-0.005***	-0.006**	-0.074***
	(0.005)	(0.002)	(0.003)	(0.027)
Dist. budget balance*Pressure *NACE_E	-0.000	0.000	-0.002	-0.010
	(0.004)	(0.001)	(0.002)	(0.021)
Dist. budget balance*Pressure *NACE_F	-0.012	-0.003	-0.005	-0.045
	(0.008)	(0.005)	(0.003)	(0.065)
Dist. budget balance*Pressure *NACE_L	0.000	0.006***	0.000	-0.031
	(0.004)	(0.002)	(0.002)	(0.030)
Dist. budget balance*Pressure *NACE_Q	0.007	-0.000	0.001	-0.056
	(0.007)	(0.002)	(0.003)	(0.037)
Dist. budget balance*Pressure *NACE_R	0.002	-0.000	0.000	0.001
	(0.006)	(0.003)	(0.002)	(0.042)
Firm & year fixed effects	x	x	x	x
Control variables	x	x	x	x

Notes: OLS regressions based on a triple interaction model where only the interaction terms of interest are reported. Panels (a) to (d) summarize separate regressions. The sample includes SOEs owned by state AND local governments (unbalanced panel). Control variables: sales revenue, sectoral NACE-code fixed effects, legal form fixed effects, and a dummy for a single public owner (as opposed to SOEs with multiple owners). Robust standard errors in parentheses. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

8 Conclusion

Our analysis provides the first test for fiscal rule-related budgetary cosmetics that looks at SOE micro-data and therefore allows to control for relevant firm-level characteristics. There is a reasonable justification that market-producer SOEs are usually not covered by a fiscal rule. Insofar these enterprises are managed by commercial principles and have a viable and profitable business model centered on the provision of private goods and services, they are clearly distinct from the core government and sufficiently constrained by market pressure. However, in reality, the differences between core budgets and SOEs may be more blurred. Since public majority ownership is a defining characteristic of SOEs, the controlling jurisdiction can use their ownership role to influence company strategies and management decisions against pure market considerations. This influence will then reflect the interests of politicians including their intention to formally comply with a fiscal rule that constrains the core budget.

Against this background, the strong growth of the German SOE sector in the 2010s, at the state and municipal level in particular, is a noteworthy finding in itself. This strong growth clearly raises serious questions of fiscal transparency. This trend also complicates cross-state comparisons. With the highly heterogeneous outsourcing rates of public activities from core budgets to SOEs across states, cross-state comparisons that rely on the commonly used core budget statistics may give room for biased conclusions. However, the simple correlation between the debt brake's lagged implementation phase and SOE growth may simply be accidental. The sector's growth could equally reflect a trend towards more functional decentralization and new public management over the past decade; or it could stand for a countermovement against earlier privatization trends that reflects a change in the dominant ideology on the role of the government in a market economy.

Since aggregate trends are hardly informative, our identification strategy exploits the cross-state variance in rule-related compliance pressure. We show that the patterns in financial indicators of SOEs over the debt brake implementation decade are largely in line with a budget-cosmetics hypothesis. A higher degree of compliance pressure is associated with a fall in SOE equity and reserves; moreover there is indication of a debt buildup. This particular pattern supports the view that the SOE sector may be used to mitigate rule-related consolidation pressure in the states' core budgets.

Our most well-defined and most convincing treatment indicator, the *Consolidation-aid state* dummy, exhibits the most consistent and robust results. This specification is motivated by the institutional features that these particular states were threatened with an immediate pecuniary fine for non-compliance as they would have risked to lose the consolidation-aid payments otherwise. This finding points to the relevant incentivizing role of credible monetary fines in order to assure compliance. A further important conclusion supported by our results is that the pressure from a fiscal rule that only binds one federal layer can have noticeable vertical spillover effects to the lower federal layer. Further research is needed to better understand the underlying

mechanisms of such potential spill-over effects from the state level to SOEs at the municipal level.

Finally we would like to emphasize the conservative nature of our test. With the focus on changes in financial variables within SOEs, our study concentrates on the intensive margin and the question to which extent existing SOEs may be used as an instrument to mitigate fiscal pressure in the core budget. Future research could study the extensive margin and the foundation of new SOEs and their differentiated federal patterns.

Appendix

Table A1: Summary statistics

Variable	N	Mean	Std. dev.	1st perc.	99th perc.
Outcome variables					
Credit-market debt (log)	88,312	14.763	2.664	3.611	19.670
Equity (log)	152,093	14.255	2.495	9.151	19.625
Reserves (log)	116,985	14.346	2.513	7.068	19.433
Return to capital	158,120	1.373	11.674	-48.861	32.932
Treatment variables					
Consolidation-aid state (dummy)	161,016	0.108	0.310	0	1
State deficit (dummy)	161,016	0.322	0.467	0	1
Fiscally constrained (dummy)	161,016	0.500	0.500	0	1
Distance to budget balance (100€ p.c.)	161,016	0.545	1.271	0.000	5.930
Control variables					
Market-producer SOE (dummy)	161,016	0.824	0.381	0	1
Single public owner (dummy)	161,016	0.638	0.481	0	1
Sales revenue	161,016	2.25e+07	2.38e+08	0	3.25e+08
Legal form (dummies)					
Eigenbetrieb (or similar)	161,016	0.226	0.418	0	1
Zweckverband (or similar)	161,016	0.068	0.252	0	1
Other public legal form	161,016	0.035	0.184	0	1
GmbH	161,016	0.588	0.492	0	1
OHG, AG, KG (or similar)	161,016	0.069	0.254	0	1
Other private legal form	161,016	0.013	0.113	0	1
Economic sector (NACE-code dummies)					
A: Agriculture, forestry, fishing	161,016	0.004	0.061	0	0
B: Mining, quarrying	161,016	0.001	0.023	0	0
C: Manufacturing	161,016	0.003	0.057	0	0
D: Electricity, gas, etc.	161,016	0.116	0.320	0	1
E: Water, sewerage, waste manag.	161,016	0.231	0.422	0	1
F: Construction	161,016	0.020	0.141	0	1
G: Wholesale & retail trade, etc.	161,016	0.003	0.053	0	0
H: Transportation & storage	161,016	0.052	0.221	0	1
I: Accommodation & food service	161,016	0.009	0.096	0	0
J: Information & communication	161,016	0.019	0.136	0	1
K: Financial & insurance activities	161,016	0.025	0.156	0	1
L: Real estate activities	161,016	0.124	0.330	0	1
M: Professional, scientific, technical	161,016	0.091	0.287	0	1
N: Admin. & support service activ.	161,016	0.044	0.204	0	1
O: Public admin., social security	161,016	0.069	0.253	0	1
P: Education	161,016	0.023	0.151	0	1
Q: Human health & social work	161,016	0.082	0.274	0	1

Table continues on next page.

Table A1 continued.

Variable	N	Mean	Std. dev.	1st perc.	99th perc.
Economic sector (NACE dummies)					
R: Arts, entertainment, recreation	161,016	0.062	0.242	0	1
S: Other service activities	161,016	0.022	0.147	0	1
U: Activ. of extraterritorial organiz.	161,016	0.000	0.006	0	0

Notes: Confidentiality policies of the German statistical offices do not permit the reporting of minima and maxima. Instead, we report the 1st and 99th percentiles. Summary statistics correspond to the unbalanced full sample, including both SOEs from the state and municipal level. The number of observations may deviate from the numbers reported in the results Tables 1 to 5 due to missing values for single variables.

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