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DISCUSSION PAPER

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Doubling Down Political Budget Cycles: The Role of State-Owned Enterprises

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We study the degree and nature of political budget cycles in public investments when two instruments are available: investments by core governments and, more indirectly, by state-owned enterprises (SOEs). While fiscal pressure on core budgets may induce politicians to shift election-induced investments to SOEs, voters' uncertainties in clearly attributing the benefits of SOE investments to incumbent politicians may encourage the opposite. Using administrative micro-data for over 10,500 SOEs and their public owners at the municipal level in Germany, we document substantial election cycles in both instruments. This suggests that German municipal councilors use investments broadly to enhance their re-election prospects. The total effect of elections on municipal investments in our sample is over EUR 1 billion for the pre-election year in each electoral cycle, while the past literature focusing only on core budgets would miss about a third of this effect.

JEL classification: H11, L32, D72

Keywords: election cycles, core budgets, outsourcing, transparency

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1 Introduction

State-owned enterprises (SOEs) represent a sizable sector with significant economic impact. In Germany, they are comparable in size to the core public sector, for example, when measured by the number of employees they hire. Yet, their finances are rarely the subject of academic or political debate.[1] This makes them attractive instruments for electioneering. Given their special position from a statistical perspective (they are not captured by typical public finance statistics) and from a legal perspective (they are mostly not captured by fiscal rules), there is a risk that SOEs are politicized, reducing the efficiency gains they might offer.[2] Against this backdrop, we examine the extent to which SOEs are subject to political rather than market forces, using electoral cycles for identification. Our main contribution lies in integrating two perspectives on public investment: that of SOEs and that of their owners. We examine the relative role of SOEs in shaping electoral cycles in municipalities that have both instruments at their disposal.

By focusing on SOEs and their owners, we address two research questions: First, we discuss theoretically and test empirically whether the electoral cycle gives rise to a political budget cycle (PBC) by SOEs. This question has received little attention in the existing literature. We argue that the incentives that lead to PBCs in core budgets also apply to SOEs, although there are differences. Our results confirm the existence of a PBC in SOE investment. We focus on investment spending

[1] Despite recent efforts to implement commercial accounting standards at the municipal level in Germany (e.g., Christofzik, 2019), consolidated financial statements that integrate the financial situation of SOEs into municipal accounts and thus increase transparency are still the absolute exception.

[2] Heinemann and Nover (2023) examine the implementation of the German debt brake at the state level in 2020 and document a decrease in state and municipal SOE equity and reserves and an increase in SOE debt in fiscally constrained states when compared to SOEs in less fiscally constrained states and the shorter the distance to the 2020 deadline. This points to circumvention and creative accounting practices that make use of SOEs (see also Potrafke, 2023, on this aspect).

as a widely used and comparable policy instrument by both municipalities that own SOEs and SOEs. This allows us to, secondly, investigate the role of SOEs for politically-motivated spending in the public sector more generally and examine their role in the electoral process vis-à-vis core budgets. To this end, we also examine the PBC in municipal core budgets and compare it with that of SOEs. We ask whether the *total* PBC for municipalities that own SOEs is larger when SOEs are included. This is crucial to understand because previous evidence that ignores SOEs and focuses only on core budgets may underestimate the true extent of election-driven policy decisions. Our results confirm this for the sample of German municipalities that own at least one SOE and where municipalities can strategically adjust SOE investment in response to electoral incentives.

Regarding the theoretical underpinning of our analysis, Tufte (1978) provides a concise framework for conceptualizing the idea of a PBC. He argues that for policy variables to exhibit election-driven cyclical patterns, three elements must be present: (1) a motive, (2) an opportunity, and (3) an instrument.

The standard motive for politicians is their interest in being re-elected. This can lead to behavior aimed at impressing voters, especially just before elections when voter interest peaks. This motive applies not only to core budgets but also to potential election cycles in SOEs. Moreover, internal motives of SOE managers, such as fear of replacement under a new government, may lead to increased investment before elections.[3] Additionally, municipal council members often serve on SOE boards, incentivizing them to advocate for increased SOE investment to secure re-election and the prestigious position.

[3]De Meo and Ferrari (2018) find suggestive evidence for a 16% increase in the probability of observing the appointment of a new board member in Italian SOEs due to party turnover at the level of the municipal owners. A related study by Shen and Lin (2012) exploits such board member turnover in state-owned banks (SOBs) associated with national elections in 63 countries. The authors do not provide information on the frequency with which CEOs or chairpersons of SOBs are replaced after an election.

Regarding opportunities, arguments both for and against an election cycle in SOEs' investment behavior exist. An amplifying factor is that German municipalities face fiscal constraints and have limited policy instruments, potentially leading to a substitution toward less restricted financing instruments such as SOEs (Von Hagen, 1991; Von Hagen and Wolff, 2006; Inoue, 2020). This would also imply potential contingent liabilities and risks to public finances (Baum et al., 2021). In a similar vein, there are stronger checks and balances in core budgets than in SOEs (Asatryan et al., 2022). Consequently, voter scrutiny over public finances likely is more pronounced for core budgets, incentivizing the delegation of public investment tied to electioneering to SOEs. In terms of moderating factors, there may be lower awareness among voters regarding SOE investment, reducing their attractiveness for electioneering despite their financing advantages. Yet, numerous SOEs offer services formerly provided by the core budget. This blurs the line between core budget and SOEs, with some municipalities still funding these services within the core budget.[4] As a result, whether voters attribute SOE activities to incumbent politicians remains an empirical question.[5]

Finally, any policy tool available to incumbent politicians can serve as an instrument to convince voters of their ability and suitability for the next term.[6]

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[4]In about 69.5% of German municipalities, there is not a single local SOE in 2019, according to our data.

[5]Departing from the PBC literature, there are papers that study the existence and effects of political *business* cycles. Dating back to Nordhaus (1975), this literature argues that generally good economic conditions in the relevant jurisdiction – influenced by policy decisions – increase the re-election odds of incumbent politicians (for an overview, see Dubois, 2016). Higher pre-election SOE investment may therefore be an attractive instrument, even if voters do not attribute this investment activity to politicians. This argument is also stressed in the literature on PBCs in the lending activity of state-owned banks (SOBs), as discussed below.

[6]The literature has considered a wide variety of instruments in the context of PBCs, ranging from classical fiscal instruments such as total public spending, capital expenditure, taxation, or transfers (e.g., Foremny et al., 2018; Repetto, 2018; Foremny and Riedel, 2014; Corvalan et al., 2018) over public employment (e.g., Cahan, 2019), public procurement (e.g., Havlik et al., 2021), or politicians extra-parliamentary activities (Geys, 2013) to economic forecasts (e.g., Cipullo and Reslow, 2022; Bohn and Veiga, 2021).

Governments, as the majority owners of SOEs, can force SOEs to pursue a particular investment plan that increases re-election chances (c.f., Shleifer and Vishny, 1994; Alok and Ayyagari, 2020; Li et al., 2020). Therefore, SOEs are yet another, previously understudied, instrument that incumbent politicians may leverage for electioneering purposes.

In summary, our theoretical discussion highlights the attractiveness of SOEs as an instrument for electoral campaigning alongside core budget investment spending. We therefore expect to find an election cycle in SOE investment and empirically examine the relative role of public investment through SOEs compared to investment through municipal core budgets in the context of local elections. Regarding our outcome variable of interest, it should be noted that investment projects often take time to be completed and become visible. In addition, there is often some uncertainty about the time to completion, so politicians may not want to risk making investments too late. Both characteristics of investment lead us to expect an increase in investment spending with some distance to the next election. This would also be consistent with the previous PBC literature focusing on public investment, which finds the highest or significant investment spending in the pre-election year (e.g., Veiga and Veiga, 2007; Repetto, 2018), while studies that examine more flexible spending categories in terms of timing tend to identify the peak in the election year itself (see, e.g., Akhmedov and Zhuravskaya, 2004, on direct monetary transfers to citizens in Russian regions).

For identification, we take advantage of the fact that municipal council elections in Germany are held on the same day within each state, but the election years differ across the states. This allows us to disentangle the effect of the electoral cycle on SOE investment from general time trends in investment activity. Administrative microdata on SOEs and the identity of their owners come from the federal statistical offices and cover the universe of commercially accounting SOEs

in Germany. They allow us to track investment dynamics at the firm level while controlling for relevant firm- and owner-level characteristics. We complement this focus on SOEs with data on public investment activity through core budgets – the municipal owners of SOEs. This provides a first insight into the interplay between public investment through SOEs and core budgets and the extent to which they are used for electioneering purposes. Our sample covers observations from all 13 area states in Germany with data on more than 10,500 SOEs and over 4,400 municipal owners over the period 2002 to 2019.

The main part of the paper examines the existence of an election cycle in SOE investment and provides evidence on the underlying mechanisms. Using event study regressions that model the full electoral cycle at the municipal level, we show that per capita SOE investment follows the cyclical pattern that is well known from the PBC literature: Investment starts to increase about two years before an election, is highest in the pre-election year, and then declines to a lower level in the post-election year and years with a greater distance to the next election. This cyclical effect is robust to different specifications and is lower for SOEs without a clear majority owner who can dictate an investment strategy. Our main specification documents a EUR 6.96 increase in per capita SOE investment at the municipal level in the pre-election year relative to the election year. Further heterogeneity analyses support the hypothesis that the observed investment dynamics are election-driven by exploiting the different timing of elections within an election year. An election earlier (later) in the year leads to a larger (smaller) increase in the pre-election year, as less (more) investment activity takes place in the election year itself as the baseline. Further analyses suggest that the PBC is stronger in municipalities where the council is dominated by a right-wing majority and is particularly pronounced in more visible sectors such as public transport, pre-primary education, or sports, cultural, and recreational education.

Our complementary results on public investment activity through the core budgets themselves show a very similar pattern to that observed for SOEs. In relative terms, per capita investment is 4.1% higher in the pre-election year than in the election year (compared to 3.4% to 4.1% for SOEs). In sum, *total* public investment in per capita terms is about EUR 18.01 higher in pre-election years relative to an election year, with SOEs accounting for about a third of the effect. We conclude that SOE activity is a relevant but understudied part of the public sector that is subject to significant political influence, most likely distorting the efficient application of funds in SOEs (see, e.g., Alok and Ayyagari, 2020, on the distortive effect of political influence on SOEs). In comparison to the established PBC literature on core budgets, this total effect still represents only a small to medium amount. For example, Repetto (2018) finds a pre-election year effect of EUR 81.80 to EUR 139.00 per capita for municipal core budgets in Italy over the period 1999 to 2012. One likely reason for this difference is the generally higher baseline investment of Italian municipalities compared to German municipalities (+55.4%). Another explanation may be provided by other PBC papers that seek to identify factors responsible for strong heterogeneities in the existence and magnitude of election cycles across countries and identify institutional factors such as long-established and well-functioning public institutions or corruption and rent-extraction opportunities as relevant determinants to explain cross-sectional differences (for an overview, see De Haan and Klomp, 2013).

The rest of the paper is structured as follows. Section 2 summarizes our literature contributions. Section 3 describes the institutional setting of German SOEs and municipal elections. Section 4 introduces the data and our econometric approach. Section 5 presents our results on SOEs and core budgets and Section 6 concludes.

2 Literature Contributions

In this section, we briefly summarize the relevant literature and discuss our contributions. Early studies on core budget PBCs have mostly considered the national level (see, e.g., Brender and Drazen, 2005; Alt and Lassen, 2006, or De Haan and Klomp, 2013 for an overview). More recently, there has been a shift in focus to subnational levels, which provide rich variation in terms of election timing and election outcomes, while also allowing for more compelling identification strategies, as the institutional setting is the same for all observations. This has led to the emergence of numerous papers investigating the mechanisms behind PBCs and identifying amplifying and moderating factors. For example, Akhmedov and Zhuravskaya (2004) and Repetto (2018) argue that voter information is a crucial determinant of PBCs. The latter exploit an exogenous reform that required the publication of municipal balance sheets before, and no longer after elections, and find that this significantly reduced the otherwise strong cycle in municipal investment in Italy. Bonfatti and Forni (2019) identify the implementation of a fiscal rule as a limiting factor for PBCs in Italian municipal investment. Drazen and Eslava (2010) present a model of PBCs that argues for a cycle in the composition of public spending rather than in the overall budget, and find empirical evidence supporting their hypothesis for Colombian municipalities. Klein and Sakurai (2015), Ferraresi (2020), and Bohn and Veiga (2021) all find evidence suggesting that term limits are another moderating factor for the existence or size of a PBC. We contribute to this literature by analyzing election cycles of SOEs and argue that these represent an amplifying factor in the sense that electioneering is potentially underestimated when the activity of SOEs is ignored.

Turning to the PBC literature that studies the German municipal setting, the focus of this paper, Foremny and Riedel (2014) exploit the same identifying variation as we do and show that changes in the local business tax follow the electoral cycle,

with growth rates of the business tax being significantly lower in the pre-election and election year as compared to other years of the electoral cycle. Foremny et al. (2018) use the different timing of council and mayoral elections in the two German states of Baden-Württemberg and Bavaria and identify a sizable election cycle in total spending of municipal core budgets for council elections. Hessami (2018) exploits a reform in the German state of Hesse, creating quasi-experimental variation across municipalities, after which mayors were no longer appointed by the council, but rather directly elected by voters. She finds that in election years, elected mayors attract 7.4% more investment transfers (in per capita euro values) from the state than appointed mayors – an outcome for which they can clearly claim credit, given their institutional responsibility, and which is consistent with the hypothesis that re-election incentives affect policy choices.[7] We extend this literature by conducting the first large-sample analysis of a PBC in total public investment by German municipalities (as the owners of SOEs).

With respect to PBCs in SOE activities, we are aware of only three directly related studies: First, Inoue (2020) examines SOEs in the Brazilian water sector and finds higher employment by these entities in state election years over the period 2004–2014, an effect that is stronger in economically disadvantaged regions and lower when the SOE is partially privately owned. Second, with a similar focus on SOE investment as our analysis, Alok and Ayyagari (2020) study large project-level investments by Indian SOEs and private firms, exploiting variation in state and national elections over the period 1995–2009. They find an increase in project announcements and project size for SOEs during elections. No effects are found for the placebo group of private investment. They show that the PBC

[7]For the state level, Tepe and Vanhuysse (2009) and Tepe and Vanhuysse (2013) examine the timing of hiring decisions for teachers and police officers and find more intensive hiring activity in election periods.

is stronger in districts with highly-contested elections, establish that additional investment increases the margin of victory of incumbent parties, and provide suggestive evidence of a negative effect on shareholder value, given indication for a negative net present value of the additional projects. SOE investment is also the outcome variable of interest in the third study by Li et al. (2020). The authors examine the investment dynamics of SOEs in most EU countries over the period 2001–2015. They rely on Bureau van Dijk's Amadeus database, which covers only a subset of all SOEs, and relate SOE investment to national elections, regardless of whether SOEs are owned by the central government or by subnational governments. They find large increases in SOE investment around elections, an effect that is stronger in close elections, in countries with weaker institutions, and in countries with a state-dominated banking system. A fourth paper differs slightly from the previous ones in that it tests Benford's Law for the financial statements of SOEs owned by Italian municipalities. This law considers the distribution of numbers in large data samples and is commonly used in the auditing and fraud detection literature. Capalbo et al. (2023) show that in non-election years, the financial statements of SOEs satisfy Benford's Law, while during election seasons, the authors find suggestive evidence of manipulation in the form of diffuse data anomalies.[8] We contribute to this small but growing literature with the first study that (i) considers the combined role of SOE investments and core municipal budgets, and (ii) covers all SOEs in 13 German states, which provides a well-defined

[8]Relatedly, De Meo and Ferrari (2018) apply a regression discontinuity design to close elections in Italy and find that party turnover disrupts investment, productivity, and financial stability of municipally-owned SOEs, while SOE profitability and employment activity are unaffected. Consistent with Capalbo et al. (2023), Capalbo et al. (2021) provide evidence of election-driven earnings management in a subsample of Italian SOEs. Mang and Schmidt (2023) examine the impact of an economic stimulus package in Germany in 2009 on a cross-section of public and private hospitals. In one specification, they control for the effect of local elections and provide preliminary evidence in line with the interpretation that prior to elections, public hospitals receive funding for fewer projects but more funding for individual, potentially more visible projects.

uniform institutional setting that limits confounding factors. This allows us to assess the relative importance of SOEs and core municipal budgets in driving local investment cycles and to explore differences across SOEs, for example by economic sector.

While there is surprisingly little research on election cycles in SOEs, a related literature examines lending cycles of state-owned banks (SOBs, for an overview, see Weill, 2022). These are typically not considered as SOEs, nor are they part of our empirical analysis, but like SOEs they are subject to political influence. A seminal paper in this literature is Dinç (2005), who provides cross-country evidence of higher lending by SOBs in election years relative to private banks. Taken together, these papers present two key findings relevant to our analysis: First, political influence around elections is strong and leads to increased lending, and second, this impact of the electoral cycle negatively affects loan quality, repayment rates, and bank performance (e.g., Cole, 2009 on India; Carvalho, 2014 on Brazil; Lavezzolo, 2015 on Spanish regions; Englmaier and Stowasser, 2017 on German local savings banks; Faraz and Rockmore, 2020 on Pakistan). In contrast, Baum et al. (2010) find that the behavior of Turkish SOBs is not significantly different from that of Turkish private banks during national parliamentary election seasons, while Bircan and Saka (2021) confirm the existence of a lending cycle for Turkish local elections.

Finally, although there is a paucity of work on the relevance of SOEs to election cycles, there is a large literature that considers SOE activity more generally.[9]

[9]Most of this economic research focuses on the policy question of whether or not to privatize SOEs (for reviews, see Megginson and Netter, 2001; Sheshinski and López-Calva, 2003; Barkley, 2021). The evidence that SOEs are inefficient compared to private firms is generally well established (e.g., Atkinson and Halvorsen, 1986; Ehrlich et al., 1994; Hausman and Neufeld, 1991; La Porta and López-de Silanes, 1999). This particular aspect has fueled a wave of privatization of SOEs in the 1980s, which was further reinforced by the market transition processes of the 1990s following the dissolution of the Soviet Union (IMF, 2020). The literature of this period tends to focus on the political-economy reasons behind the question of why governments strug-

With a similar focus on political influence as our analysis, Menozzi et al. (2012) find evidence for the hypothesis that politically-connected board members in Italian SOEs increase firm employment while reducing profitability when compared to non-connected board members. Asatryan et al. (2022) provide a descriptive overview of SOEs in Germany and argue that they represent a substantial but often ignored part of the overall public sector. The authors refer to SOEs as "other governments" because of their importance to the public sector but separate statistical and legal status. Boll and Sidki (2021) study the effect of politically-fragmented councils in German municipalities on SOE investment and find some evidence of a negative impact.

3 Institutional Background

3.1 Municipal Governments and Elections

Compared to many other industrialized countries, Germany is rather decentralized, consisting of the central government, 16 federal states and about 11,000 municipalities. Municipalities are either organized in counties, where several (smaller) municipalities together form a county and the county government takes on overarching tasks such as the provision and maintenance of county roads, or municipalities form a district on their own. The latter case typically describes larger municipalities, which are called urban districts and they are responsible for both municipal-level and district-level public tasks. While municipalities generate significant revenues of their own, mainly by taxing local businesses' profit and private

gle to manage SOEs effectively, for example, highlighting the role of rent-seeking (Djankov and Murrell, 2002). More recently, the special case of China, which combines extraordinary growth with the large presence of SOEs in its economy, has generated renewed interest in SOEs (e.g., Fan et al., 2007; Storesletten and Zilibotti, 2014; Berkowitz et al., 2017; Lin et al., 2020).

property within their jurisdiction (e.g., Foremny and Riedel, 2014), counties do not have any tax-setting autonomy of their own and are mostly financed by a fee that they levy on their member municipalities (the so called *Kreisumlage*). As counties are thus quite different from the municipalities, we focus our analysis on the effect of the electoral cycle on SOEs owned by municipalities and urban districts only.

On the political side, municipalities are governed by a local council and a mayor. Both types of politicians are not subject to a term limit. Together, they form the local executive and are elected by the local population (details see below).[10] Majorities in the council change, depending on the issue under discussion, so there is no well-defined ruling party or coalition and no opposition. Municipal tasks are either mandatory (e.g., public administration, school buildings, local roads, sewerage management, social housing, or local police and fire protection) or voluntary (e.g., recreation, culture, and sports or business development). Municipalities may choose to outsource some of these activities to SOEs (for details see Section 3.2). In total, municipalities are responsible for about 40% of public spending in the federal states (Federal Statistical Office, 2017).

The details of municipal duties, elections, and the decision-making powers are regulated by the so-called municipal code (*Gemeindeordnung*) of the respective state. These differ in the timing and frequency of elections, but are otherwise similar in the institutional details relevant to a PBC analysis (e.g., Foremny and Riedel, 2014). Municipalities in all states are subject to fiscal rules: Debt may only be taken on in order to finance investment projects or to bridge short-term liquidity shortfalls. Elections for the local council take place every five or six years, while the mayor is elected in a separate election and remains in power for five to eight

[10]Note that there is no legislative at the municipal level, as the local council governs only in the form of statutes and legal norms, while laws can only be enacted or amended by state governments or the federal government.

years (in the small state of Saarland, she is elected for ten years).[11] The mayor has a special position in that she is the head of the municipal administration and typically represents the municipality. Otherwise, the mayor usually has the same voting rights as the council members. Since important decisions that shape municipal policy are voted on by the council, typically by a simple majority, we focus our analysis on the electoral cycles of council elections.[12] While elections are held on the same day within states, the different timing of these elections across states allows us to disentangle the effects of the electoral cycle from general trends in public investment over time. Figure 1 shows the distribution of council elections for our sample, which spans from the year 2002 to 2019.

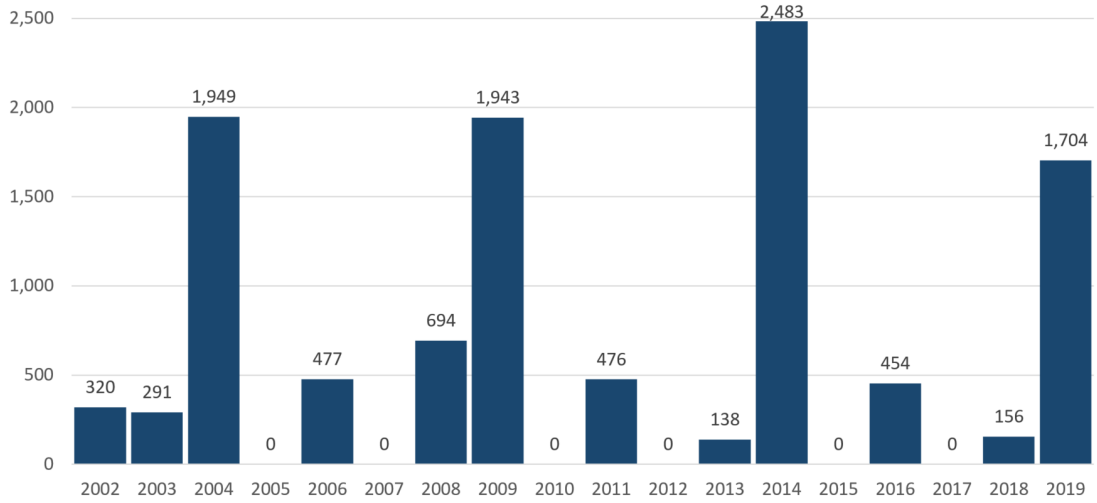
3.2 State-Owned Enterprises (SOEs) in Germany

The mainstream economic rationale for the establishment of state ownership includes the need to address market failures, for example in natural monopoly situations, to provide public goods, or because of significant externalities from private goods, for example in health and education services. In practice, however, SOEs have been established and continue to flourish for many other reasons, as evidenced by their existence in a wide range of sectors. In Germany, about half of all economic sectors have at least one SOE (OECD, 2020). In addition, SOEs also function as

[11]Compared to state and federal elections, municipal elections are much more focused on individual candidates than on political parties. As a result, municipal councilors have particular incentives to signal high competence and good performance before elections, as they often cannot rely on strong and stable party preferences among the electorate. While individual councilors may not be particularly visible to the public in normal times, it is common to see them campaigning in the run-up to an election on campaign posters on the streets, in person at public places such as farmers' markets or other campaign events, and in recent years on social media platforms.

[12]In five of the 13 area states, council elections and mayoral elections are often held on the same day, though not in all elections considered. Foremny et al. (2018) examine the existence of a PBC in both council and mayoral elections in Germany. They find robust evidence of a cycle in total municipal expenditure associated with council elections, but not with mayoral elections. However, the effect in the year prior to a council election is slightly larger when a mayoral election is held in the same year as a council election, but only when the mayor re-runs for office.

Figure 1: Number of municipal elections by year



Notes: The figure shows the number of municipal elections (at the level of municipalities as the owners of SOEs) per year for the observations covered in this paper.

an instrument to facilitate economic activity in general (Federal Statistical Office, 2023). The list of more than 20,000 German-based SOEs is therefore highly diverse and includes airports and railway companies, universities, nursing homes and hospitals, energy utilities, water supply and waste disposal services, special purpose associations for organizing inter-municipal cooperation, real estate firms in charge of managing public property, and even breweries, among many others.

Institutional details regarding German SOEs have, for example, been described and discussed in Asatryan et al. (2022) with a focus on the structure of the SOE sector and its economic relevance, Hesse et al. (2017) with a focus on SOE investment in the context of a public investment shortage in recent years, or Schmidt (2011), Schmidt et al. (2017), and Wägner (2017) who look at the SOE sector from the perspective of a statistician.

By definition, and according to the European System of Accounts (ESA 2010), SOEs describe all units in which governments hold a majority share of more than

50% in terms of capital or voting rights (Eurostat, 2013; Schmidt, 2011).[13] The implication of this property is that policymakers, not just markets, shape the decisions of SOEs. At the same time, most SOEs operate outside of the core public sector, which means that commonly used financial statistics do not capture their activities and that SOEs receive far less attention in public and policy debates than core budgets.[14]

4 Data and Econometric Model

4.1 Data: Annual Accounts of SOEs

Our analysis of SOE investment dynamics is based on an administrative microdata set that covers the annual financial statements of all commercial accounting SOEs in Germany.[15] Asatryan et al. (2022) provide an overview of the size, structure, and economic relevance of the German SOE sector. With respect to the representativeness of the data, the authors compare the microdata with aggregate figures for the universe of all SOEs, regardless of their accounting system. This comparison suggests that the annual accounts data set covers 82.3% of all SOEs owned by local governments which is the sample on which our analysis is based (details see Asatryan et al., 2022).[16]

[13]In German, SOEs are called "Öffentliche Fonds, Einrichtungen und Unternehmen", and include not only companies but also public funds or institutions with either a private or public legal form.

[14]The criteria for the classification of public institutional units according to the government sector accounts – and the definition of SOEs – are illustrated in Appendix Figure A1.

[15]Source: Research data center of the Statistical Offices of the Federation and the Länder. The data set includes information from firms' balance sheets, income statements, and asset records. Missing information is not an issue in this data set, as SOEs are subject to disclosure requirements and must provide all information requested by statistical offices. For more details, see `https://www.forschungsdatenzentrum.de/de/finanzen/jahresabschluss`.

[16]More precisely, we restrict our analysis to SOEs owned by local governments from the 13 area states, as the municipal and state levels are not clearly distinguishable in the three city states

Focusing on the municipal level and the time period from 2002 to 2019 leaves us with over 160,000 firm-year observations relevant for our analysis. However, since we also rely on information on the owners of SOEs, we process all available information on the identity and individual shares of owners to define our final sample. Unfortunately, the information on SOE owners available to researchers is not of the highest quality, is captured by different variables, and is somewhat unstructured in the annual accounts dataset (c.f., Wägner, 2017). As a consequence, we only have sufficiently detailed information on the identity of the owners (in particular their official municipality key) for a reduced but still substantial share of 73.0% of all relevant observations.

Our outcome variable of interest is annual real investment by SOEs, which we divide by the number of inhabitants in the owner's jurisdiction to obtain a comparable per capita measure of investment.[17] Depending on the model specification and the underlying sample, per capita SOE investment aggregated to the municipal level is EUR 150 to 170. Thus, it accounts for about one third (32.3–35.1%) of total municipal investment, with core budget investment amounting to EUR 314 per capita.[18] However, the aggregate figures for total public investment show that we significantly underestimate the relative importance of SOEs for total per capita investment at the municipal level. Unfortunately, the limitations of the annual accounts dataset with respect to information on ownership of SOEs imply that we capture SOEs with per capita investment figures below the population average. While the figures for core budgets (i.e., EUR 314) are quite accurate, per

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of Berlin, Bremen, and Hamburg. Thus, SOEs in the city states often perform systematically different tasks and are not well comparable with SOEs owned by municipalities in the area states.

[17]This definition is consistent with the approach of Boll and Sidki (2021), the only other academic paper that examines SOE investment based on the microdata set. In addition to the per capita regressions, we also examine the dynamics of SOE investment in absolute terms. These results also confirm our election cycle hypothesis and are available upon request.

[18]Figures correspond to the sample considered in this analysis and not to the whole of Germany.

capita investment of SOEs is actually at EUR 360, and thus accounts for more than half of total municipal investment (see also Hesse et al., 2017). Whether this implies that we are also underestimating the relative importance of SOEs to the total PBC in municipal investment may be hypothesized, but cannot be assessed without additional data.

In addition to SOE investment, we use information on the legal form of SOEs, their ownership structure, or the main economic sector in which they operate to control for important firm characteristics. Summary statistics for these variables are documented in Table 1.

4.2 Data: Municipalities

For the SOE owners – over 4,400 municipalities – we collect a number of variables for two reasons: First, since the size, structure, and political landscape of a municipality affect SOEs' investment activities, we want to control for such municipal characteristics in the regressions. The second reason relates to the dual objective of this paper. In addition to investigating a potential PBC in SOE investment, we also seek to get a more complete picture of the overall election cycle in public investment by comparing the dynamics of SOE investment behavior with that of core budgets. Therefore, we also rely on data that capture local government investment through core budgets.

Data to control for owner characteristics in the SOE analysis come from several sources. First, basic characteristics on municipalities such as population size are taken from the official portal for data at the subnational level in Germany (Statistical Offices of the Federation and the Länder, 2023). For information on political aspects, such as voter turnout and the distribution of seats in the local councils by party, there is no centralized database. Some states make these data publicly available for municipalities within the state. For those states and years where no

data are publicly available, we contacted the relevant statistical offices and often received the data by e-mail. For the remaining observations, we collected the data by hand through an extensive online search of municipal websites and online archives of regional newspapers.

The final control variable at the municipal level for our SOE analysis is a dummy controlling for the accounting system of the owner. During the period under consideration, municipalities in most German states had to switch or voluntarily switched from cash to accrual accounting for their core budgets. As this could have an impact on the activities of SOEs in general and SOE investments in particular (see, e.g., Christofzik, 2019), the accounting system is a crucial control variable. It is even more important for the analysis of a potential PBC in investment through core budgets, as investment figures are not comparable across accounting systems. To obtain this information, we contacted all German states. Data on the switching date of municipalities were provided either by the statistical offices or by the ministries of the interior. In one state (Rhineland-Palatinate) the authorities had no information on the switching date of their municipalities. Here, we reconstructed the information by checking whether the municipalities reported whether they provided cash-based or accrual-based figures to the statistical offices. To fill in some missing data points, we conducted online searches on the municipal websites and online archives of regional newspapers. Summary statistics for both firm-level and owner-level control variables are shown in Table 1.

Finally, data on local government investment through core budgets come from a database called "Wegweiser Kommune" from the Bertelsmann foundation that obtained and processed the data from the statistical offices of the states (Bertelsmann Stiftung, 2023). As for SOEs, the variable captures real investment and, thus, represents the counterpart to SOEs' investment (Hesse et al., 2017). Measured in euro per capita, we employ this variables as our regressand in the municipal-level

Table 1: Summary statistics

Variable	N	Mean	Std. dev.	1st perc.	Median	99th perc.
Firm-level characteristics						
Single-owner SOE	104,016	0.828	0.377	0	1	1
Market producer	104,016	0.820	0.384	0	1	1
Legal form						
GmbH	104,016	0.381	0.486	0	0	1
OHG, KG, and similar	104,016	0.025	0.158	0	0	1
Other private legal forms	104,016	0.001	0.038	0	0	1
Eigenbetriebe	104,016	0.505	0.500	0	1	1
Zweckverbände	104,016	0.038	0.191	0	0	1
Other public legal forms	104,016	0.049	0.217	0	0	1
Economic sector (NACE)						
A: Agriculture, forestry	104,016	0.002	0.046	0	0	0
D: Electricity, gas	104,016	0.103	0.304	0	0	1
E: Water, sewerage, waste	104,016	0.407	0.491	0	0	1
F: Construction	104,016	0.019	0.138	0	0	1
H: Transportation, storage	104,016	0.019	0.135	0	0	1
I: Accommodation	104,016	0.005	0.073	0	0	0
J: Information/communication	104,016	0.006	0.080	0	0	0
K: Financing, insurance	104,016	0.002	0.045	0	0	0
L: Real estate activities	104,016	0.144	0.351	0	0	1
M: Professional/techn. activ.	104,016	0.023	0.150	0	0	1
N: Admin./support services	104,016	0.025	0.157	0	0	1
O: Public administration	104,016	0.063	0.243	0	0	1
P: Education	104,016	0.012	0.107	0	0	1
Q: Human health, soc. work	104,016	0.061	0.239	0	0	1
R: Arts, entertainm., recreation	104,016	0.079	0.269	0	0	1
S: Other service activities	104,016	0.023	0.150	0	0	1
Other sectors	104,016	0.008	0.097	0	0	0
Owner-level characteristics						
Population	104,016	63,754	150,943	1,110	17,290	691,518
Share population >65 years	104,016	0.213	0.036	0.141	0.209	0.317
Share working age population	104,016	0.620	0.027	0.548	0.620	0.688
Population density	104,016	613.2	657.8	33.9	377.0	2,864.4
Turnout (in previous election)	104,016	0.523	0.083	0.351	0.517	0.740
Share of seats in local council by political party						
CDU/CSU	104,016	0.355	0.135	0.00	0.358	0.656
SPD	104,016	0.243	0.129	0.00	0.246	0.545
FDP	104,016	0.042	0.049	0.00	0.033	0.200
B90/GRÜNE	104,016	0.061	0.065	0.00	0.053	0.250
PDS/DIE LINKE	104,016	0.048	0.086	0.00	0.000	0.335
AfD	104,016	0.005	0.022	0.00	0.000	0.111
Others/indep. counselors	104,016	0.247	0.221	0.00	0.183	1.000
Accrual accounting system	104,016	0.428	0.495	0	0	1

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. Sample period: 2002–2019. Summary statistics correspond to the sample used in our main specification.

analysis for core budgets. As the Bertelsmann data cover a slightly shorter time period (i.e., 2006–2019 instead of 2002–2019 as for SOEs) and only contain information on municipalities with a population of around 5,000 or more, this part of the analysis is limited to a smaller sample than the main SOE analysis. Summary statistics for this reduced-sample analysis at the municipal level are documented in Appendix Table A2.

4.3 The Econometric Model

To identify a potential cycle in SOE investment, we follow the established literature (e.g.,Repetto, 2018; Inoue, 2020) and estimate event study regressions that model the entire electoral cycle of German municipalities, the owners of SOEs. The identifying variation stems from the fact that electoral cycles differ in their timing across German states. This allows us to disentangle the effect of the PBC from general time trends in SOE investment.[19] In particular, our main specification is based on the following regression model:

$$ln(y_{i,m,t}) = \alpha + \beta' \mathbf{d_{m,t}} + \gamma' \mathbf{X}_{i,t} + \delta' \mathbf{Z}_{m,t} + \alpha_i + \alpha_t + \varepsilon_i, \quad (1)$$

[19]This identification approach is consistent with the established PBC literature on Germany (e.g., Foremny and Riedel, 2014; Tepe and Vanhuysse, 2009). It identifies the effects of interest as long as SOE investment does not follow state-specific trends that are aligned with the electoral cycle of the state and are not captured by the included control variables. Although there are differences in the magnitude and length of business cycles across German states that may affect public investment, these cycles follow the same trend and are usually not state-specific but are rather common to larger regions or groups of states (with different electoral cycles), so we are confident that our identification approach provides reliable estimates (see, e.g., Lehmann and Wikman, 2023, for an analysis of state business cycles). In a robustness test, we also take into account state-level elections as another potential confounding factor to rule out that they drive our results. Moreover, additional results that exploit the different timing of elections within an election year further substantiate the validity of our identification approach (see Section 5.2).

where $y_{i,m,t}$ captures per capita investment of SOE i ($i = 1, ..., 9263$) owned by municipality m ($m = 1, ..., 3696$) in year t ($t = 2002, ..., 2019$).[20] Similar to Alok and Ayyagari (2020) and Lin et al. (2020), our focus on investment is driven by the fact that it has been shown to be a key determinant of economic growth and incumbents' likelihood of getting re-elected by stimulating the local economy and local employment in the present and future. Alternative outcome variables at the SOE level, such as consumer fees or transfers to the public owners, are highly heterogeneous in terms of whether they apply to individual SOEs and how SOEs record them in their accounts, so focusing on investment facilitates a more comprehensive analysis of the role of SOEs in the electoral process. In addition, we can subsequently compare our findings with those for the core budget.

The election cycle is modeled by a matrix $\mathbf{d_{m,t}}$ containing five dummies equal to 1 for the years before an election as well as the post-election year, with the election year itself serving as the baseline (in line with, e.g., Repetto, 2018). More specifically:

$$\mathbf{d_{m,t}} = \begin{cases} d_{m,t}^{e-4} = 1 & \text{four years before an election} \\ d_{m,t}^{e-3} = 1 & \text{three years before an election} \\ d_{m,t}^{e-2} = 1 & \text{two years before an election} \\ d_{m,t}^{e-1} = 1 & \text{one year before an election} \\ d_{m,t}^{e+1} = 1 & \text{one year after an election} \end{cases} \tag{2}$$

Since most states have local electoral cycles of only five years, the identifying variation for $d_{m,t}^{e-4}$ comes entirely from the state of Bavaria, where the duration of the electoral cycle is six years, as well as from the two states of Brandenburg and

[20] The figures correspond to our main specification and are smaller or larger for other models.

North Rhine-Westphalia, which moved their elections from 2013 to 2014 and 2019 to 2020, respectively.[21]

To control for firm-level characteristics, $\mathbf{X}$ includes a dummy for market-producer SOEs (as opposed to non-market producers/extra budgets), a dummy for single-owner SOEs, legal form fixed effects, and NACE code fixed effects. Time-invariant SOE characteristics are captured by firm fixed effects α_i. At the level of SOE owners, $\mathbf{Z}$ includes several control variables for municipalities. In particular, we control for population size, the share of the population aged 65 and over, the share of the population of working age (18–64), the population density, voter turnout in the last council election, the share of seats held by the main political parties (i.e., CDU/CSU, SPD, FPD, B90/GRÜNE, PDS/DIE LINKE, AfD), and a dummy to capture the accounting system of the owner to account for the fact that municipalities switched from cash to accrual accounting standards during the period considered (see discussion in Section 4.2). Finally, α_t represents year fixed effects. Standard errors are clustered at the municipal level. Table 1 provides summary statistics for all variables.

In order to examine heterogeneities in investment dynamics, we extend our regression model in Equation (1) to include interaction terms for subgroups of the sample. The model then reads as:

$$ln(y_{i,m,t}) = \alpha + \beta' \mathbf{d_{m,t}} + \theta Subgroup_{i,m,t} + \lambda' \mathbf{d_{m,t}} \times Subgroup_{i,m,t} + \gamma' \mathbf{X}_{i,t} + \delta' \mathbf{Z}_{m,t} + \alpha_i + \alpha_t + \varepsilon_i, \quad (3)$$

where *Subgroup* denotes, for example, SOEs where the owner's council is dominated by left-wing parties, as opposed to councils dominated by right-wing parties.

[21] In the case of Brandenburg, the reason for the change in the election year was to align the local electoral cycle with the EU election cycle. In North Rhine-Westphalia, the aim was that council elections were again to be held on the same day as the mayoral elections.

The effect of the electoral cycle for such a subgroup thus includes both the baseline estimates β' and the estimates of the interaction term (i.e., λ').

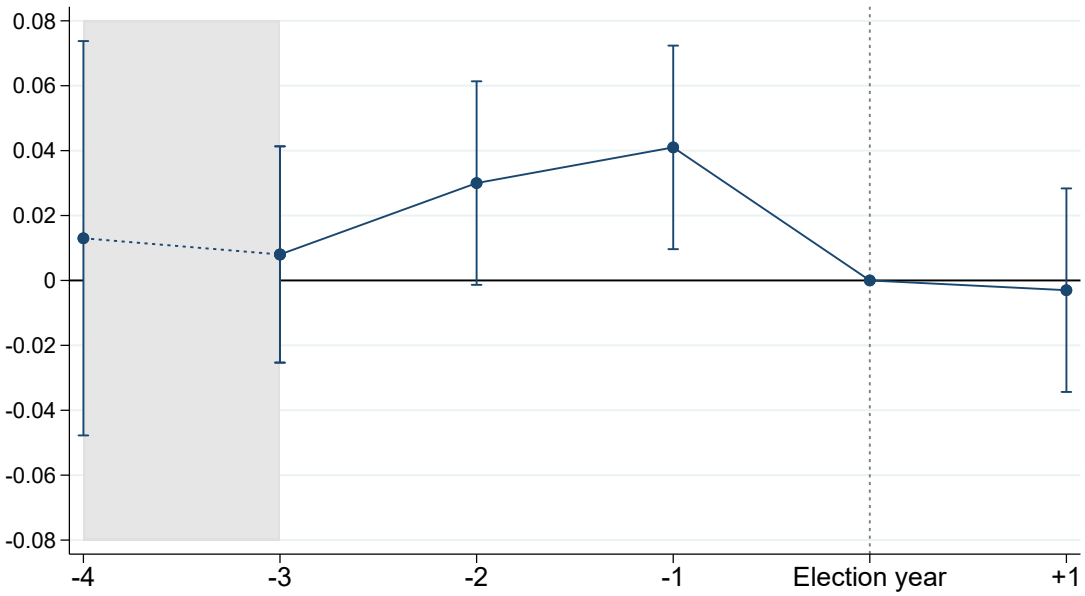
A final conceptual comment relates to a common concern in papers examining PBCs in core budgets: After an election, some share of politicians are newly elected to office and are in a position to familiarize themselves with public administration procedures, agree on an agenda for the term, and possibly cancel previous investment projects of their predecessors. This in itself could lead to a cyclical pattern in core budget investment that is aligned with the electoral cycle but not driven by re-election motives, complicating the identification of PBCs in core budgets (e.g., Repetto, 2018). Since there is no direct effect of an election on the composition of SOE boards, and election outcomes may only have an indirect impact if new politicians and political majorities decide to replace individual board members, we expect this restructuring effect of the (political) leadership to be weaker for SOEs than for core budgets. Empirically, this means that core budget estimates might overestimate the PBC, while this should be less of an issue for SOE estimates.

5 Results on PBCs in Public Investment

5.1 Main SOE Results

Figure 2 presents our main results on the dynamics of SOE investment along the electoral cycle. The figure shows a clear cyclical pattern: Two years before an election, and even more so one year before an election, SOE investment in per capita terms is 3.0% and 4.1% higher than in the election year, respectively. In the other years of the electoral cycle, investment figures are not significantly different

Figure 2: Election cycle in public investment – SOEs



Notes: Coefficient estimates and 95% confidence intervals based on Equation 1 (see also model (3) in Table 2). Standard errors clustered by municipality. The shaded area on the left indicates that the typical election cycle lasts only five years (i.e., from -3 to +1). The identifying variation for the coefficient four years before an election comes only from municipalities in the state of Bavaria as well as from one extended electoral cycle in the states of North Rhine-Westphalia and Brandenburg, respectively (details see Section 4.3).

from the election year that serves as the baseline.[22] This evidence speaks in favor of the interpretation that SOEs take an active role in the campaigning efforts of incumbent politicians and strategically decide on investments so that they are higher in the run-up to an election.

In terms of magnitude, our results suggest that SOE per capita investment at the municipal level is EUR 6.96 (EUR 3.12 at the firm level) higher in the pre-election year than in the baseline year. Taking into account also the effect two years before an election, which just falls short to be statistically significant at the 5%-level, this leads to per capita investment at the municipal level being higher

[22]The effect four years before an election is estimated relatively imprecisely, as the underlying identifying variation is much lower than for the other years of the electoral cycle (see discussion in Section 4.3.)

by EUR 12.05 compared to the election year. The fact that SOE investment does not decline again in years with a greater distance to the next election may be taken as preliminary evidence that SOEs actually increase investments in the pre-election years, rather than shifting investment across the electoral cycle to invest in strategically advantageous years. Yet, further analyses of SOEs' financing is needed to substantiate this hypothesis.

Table 2 shows the robustness of the election cycle pattern for SOE investment across various model specifications and sample definitions, with model (3) representing the main specification also depicted in Figure 2. In particular, the pre-election year effect is robust as to the inclusion of minority interests (see column 4). These observations do not have a single owner holding more than 50% of the firm, but are instead owned by multiple minority owners. When these SOEs are counted as owned by the largest minority shareholder, the pre-election year effect remains statistically significant at the 5% level, but is reduced by almost 20%. This is to be expected as the absence of a single controlling shareholder prevents the easy use of an SOE for creative financing activities.

Models (5) and (6) in Table 2 examine the impact of changes in the identity of the majority owner. In most cases, this will not be a situation where an SOE is sold to another municipality, but rather a change in the structure of the majority owner due to a merger or dissolution of municipalities. Controlling for changes in the identity of the owner could have opposing effects. On the one hand, it could necessitate new investments to meet the requirements of the new (structure of the) owner (e.g., because the SOE now provides its services to more people and areas). From a political economy perspective, there is an incentive to time such investments to take place predominantly just before an election. Changes in majority ownership would then increase the election cycle effect. On the other hand, taking over an SOE that was previously owned by another or differently

Table 2: Election cycle in public investment – SOEs

	Unbalanced panel					Stable owner	Balanced panel
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Election year −4	0.007	0.008	0.013	0.013	0.010	0.019	0.035
	(0.031)	(0.031)	(0.031)	(0.029)	(0.032)	(0.031)	(0.034)
Election year −3	0.001	0.002	0.008	0.008	0.005	0.007	0.016
	(0.017)	(0.017)	(0.017)	(0.016)	(0.017)	(0.017)	(0.021)
Election year −2	0.015	0.016	0.030*	0.029*	0.025	0.024	0.033*
	(0.015)	(0.015)	(0.016)	(0.015)	(0.016)	(0.016)	(0.019)
Election year −1	0.032**	0.031**	0.041**	0.034**	0.036**	0.033**	0.042**
	(0.014)	(0.014)	(0.016)	(0.015)	(0.016)	(0.017)	(0.019)
Election year +1	-0.012	-0.013	-0.003	-0.007	-0.007	-0.003	-0.010
	(0.016)	(0.016)	(0.016)	(0.015)	(0.016)	(0.016)	(0.019)
Baseline investment in EUR per capita	76.37	76.37	75.83	95.99	75.83	71.06	79.92
SOE fixed effects	x	x	x	x	x	x	x
Year fixed effects	x	x	x	x	x	x	x
SOE controls		x	x	x	x	x	x
Municipality controls			x	x	x	x	x
Incl. minority interests				x			
Municipality fixed effects					x		
Number of observations	104,051	104,051	103,412	118,096	103,367	86,542	69,707
R-squared	0.765	0.765	0.766	0.774	0.772	0.773	0.746

Notes: *** p<0.01, ** p<0.05, * p<0.1. Results correspond to Equation 1. Standard errors clustered by municipality. Model (5) is limited to SOE observations that are part of the dataset every year over the entire sample period from 2002 to 2019. For model (6), all observations are dropped that experienced a change in the owner during the considered period.

structured local government may require the establishment of effective monitoring and governance of the firm before it can be used for strategic investment decisions. A change in majority ownership would then reduce the PBC. Econometrically, we consider changes in ownership in two different ways: Model (5) simply includes owner fixed effects, while model (6) examines the dynamics of SOE investment over the electoral cycle for firms with stable ownership only. The results suggest that the first channel dominates, as the pre-election year effect is 0.5 to 0.8 percentage points lower when controlling for major changes in the ownership structure.

Finally, model (7) in Table 2 documents the results for a reduced sample that only considers firms that are present in the dataset every year over the entire sample period from 2002 to 2019. This addresses the concern that SOEs newly

entering the annual accounts dataset (see Section 4.1) might affect the estimation of an election cycle in SOE investment. As model (7) shows, the dynamics in SOE investment two years and one year before an election are almost unchanged by this sample adjustment.

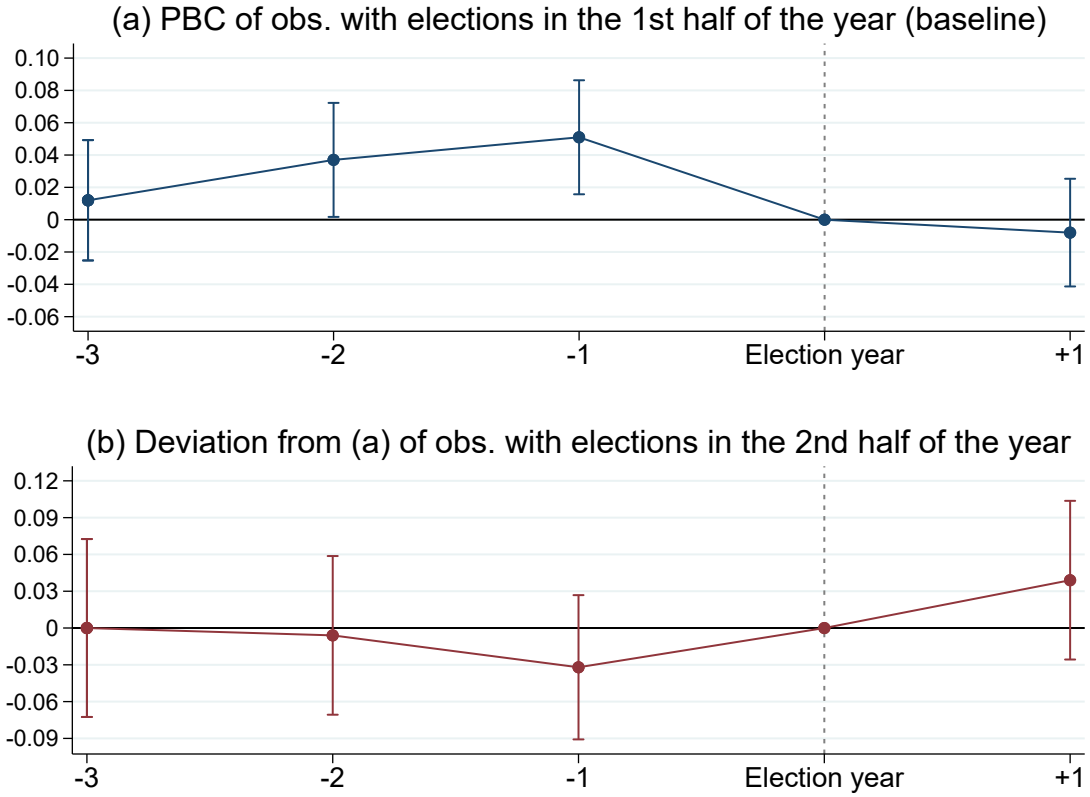
In addition to Table 2, we test whether the identified effects are driven by observations from a single state by dropping all SOEs that belong to municipalities from the same state one by one. The results are presented in Appendix Table A1 and reject this hypothesis. The effect in the pre-election year is quite stable in magnitude and varies from 3.7% to 4.8% (compared to 4.1% for the full sample). The effect two years before an election ranges from 2.5% to 4.1% (compared to 3.0% for the full sample), but remains statistically insignificant at conventional levels in all but two of the 13 regressions.[23]

5.2 Heterogeneities in the SOE Election Cycle

In this section, we consider heterogeneities among SOEs along three dimensions in order to learn more about the drivers and mechanisms behind our results. In particular, we examine differential dynamics of SOE investment by (1) the timing of local elections within the election year, (2) the distribution of seats in local councils, and (3) the economic sector associated with an SOE. To this end, we augment our main econometric model to include an interaction of the electoral cycle

[23]Some PBC papers also consider vertical interactions between municipal elections and higher-level elections for regional or state parliaments (e.g., Foremny and Riedel, 2014; Cahan, 2019). Some of them find an effect of higher-level elections on municipal policy or a stronger local PBC for politically aligned jurisdictions. We test for the influence of state-level elections once by including a dummy for state election years and once by modeling the full electoral cycle for the states as we do for municipalities. In both cases, we find no increase in investment of municipal SOEs around state elections, while the PBC around municipal elections is robust and larger than in models where we do not control for state elections (results are available upon request).

Figure 3: Election cycle in SOE investment – heterogeneity by election date within the election year



Notes: Coefficient estimates and 95% confidence intervals based on Equation 1, but including an interaction term that separately models the election cycle for SOEs where local elections at the owner level were held during the second half of the year. Observations where elections took place during the first half of the year represent the baseline (see Panel (a)). Panel (b) shows the interaction terms. Standard errors clustered by municipality.

dummies with dummies for the respective subgroups of the sample (see Equation 3 in Section 4.3).[24]

Figure 3 starts with an analysis that looks at the different timing of municipal elections within an election year. For about a fifth of the observations (20.1%), elections are held in the second half of the year, leaving more time to invest in the early months of the election year to signal good performance or to please spe-

[24]To avoid problems in interpreting estimates with small sample sizes, we do not report estimates for the year four years prior to an election in all of the analyses in this section, as it can only be estimated for at most three of the 13 area states considered (details see Section 4.3).

cific voter groups and constituencies. As a result, this increases the baseline (i.e., investment in the election year) in our main specification and should therefore reduce the cyclical pattern in the years preceding an election (see Hessami, 2018, for a similar test). Figure 3 confirms this hypothesis. Panel (a) depicts the dynamics of SOE investment for observations with elections early in the year and shows that the cyclical pattern is more pronounced compared to our main specification, which looks at average effects (increase of 5.1% compared to 4.1% in the pre-election year). Panel (b) of Figure 3 documents the interaction terms, confirming our expectation that the effect in the pre-election year should be smaller for observations with elections late in the year. The difference is not statistically significant at conventional levels.

Figure 4 continues our heterogeneity analysis by looking into the relevance of political majorities in the municipal councils for SOE investment. It differentiates between SOEs where the owner's governing body is dominated by either right-wing or left-wing parties, or where there is no clear left-right majority.[25] This relates to the large literature examining the role of party ideology for policymaking and public spending (see, e.g., Potrafke, 2018, who reviews the literature for the US and finds mixed evidence for the hypothesis that left-wing governments tend to adopt expansionary policies more often and have higher spending). Following the common argument in this literature, one might expect a stronger PBC in SOEs owned by a municipality with a left-dominated council. On the contrary, Veiga et al. (2019) and Lopes da Fonseca (2020) discuss the possibility that politicians

[25]Another relevant channel could be the influence of political fragmentation as more fragmented municipalities might find it more difficult to pressure SOEs before elections. Using the same dataset as in our analysis, Boll and Sidki (2021) examine the relationship between political fragmentation (measured by the effective number of parties) and SOE investment. They specifically test the interaction between election years and government fragmentation and find that the coefficient is not statistically significant. This result provides reassurance that the effect of political fragmentation on SOE investment does not systematically vary with the electoral cycle.

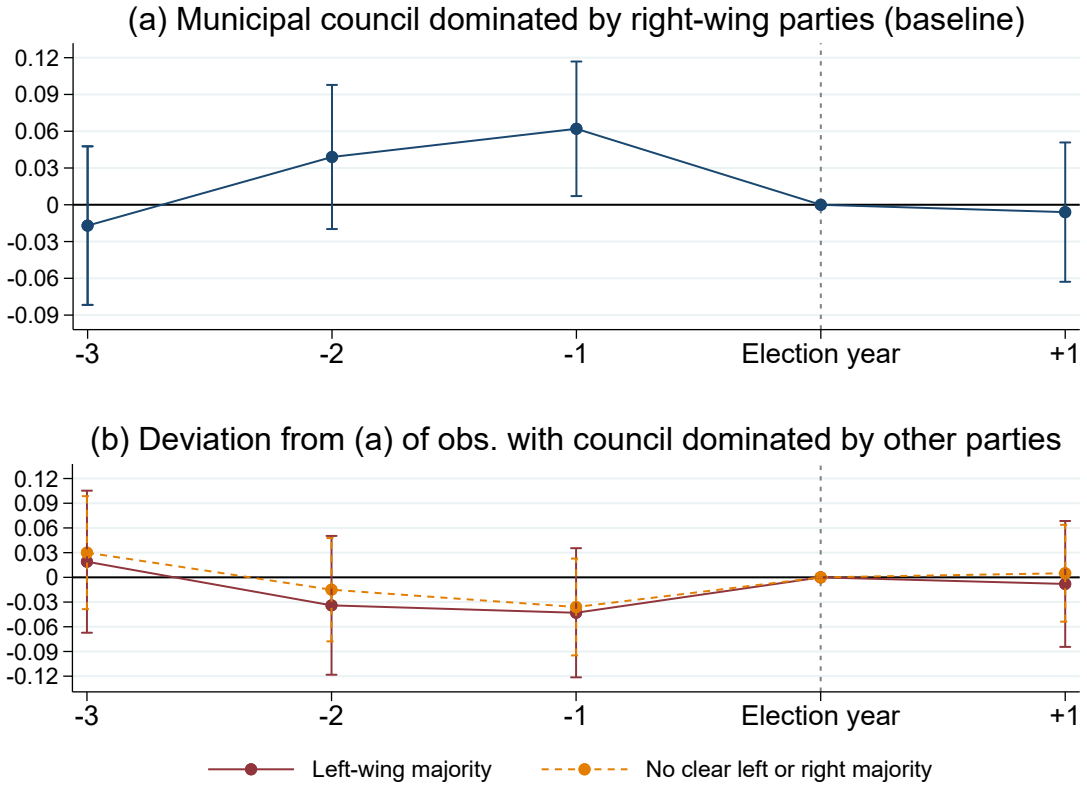
mostly act in line with their ideological preferences only when risks are low (e.g., little competition or term limits), so that right-wing politicians may also increase spending before elections.

Figure 4 shows the evidence for German SOEs, where right-wing dominated councils serve as the baseline.[26] They exhibit an investment cycle similar to the average cycle shown in Figure 2 above, but the effect size of the pre-election year is much larger at 6.4% compared to 4.1% for the full sample (see Panel (a) of Figure 4). Panel (b) shows the interaction terms and, thus, the deviation from the pattern depicted in Panel (a). The solid red line suggests that left-wing dominated councils (including members of the SPD, PDS/DIE LINKE, and B90/GRÜNE) show, if anything, a less pronounced cyclical pattern in SOE per capita investment than SOEs in municipalities with a right-wing dominated council. However, the effect is not statistically significant at conventional levels. The same conclusion is reached for the majority of SOEs, where there is no clear left-right majority in the owner's council.[27] These results tend to support a stronger SOE investment cycle in municipalities with a right-wing dominated council. In the specific case of SOEs, this could also be explained by the possibility that right-wing parties face a stronger

[26]We classify councils as right-wing dominated if council members from the center-right Christian Democratic parties (CDU/CSU), the liberal Free Democratic Party (FDP), or the right-wing populist Alternative fÃ¼r Deutschland (AfD) hold a majority, and as left-wing dominated if council members from the center-left Social Democratic Party (SPD), the democratic socialist party DIE LINKE (formerly PDS), or the green-progressive B90/GRÜNE hold a majority. On average, municipalities are more often governed by right-wing dominated councils (21.4%) than by left-wing dominated councils (16.4%). In most cases, however, there is no clear left-right majority, as smaller regional parties and independent counselors play an important role in German local politics. The results are similar when only the majorities of the two largest parties (right: CDU/CSU, left: SPD) are considered, although observed differences are somewhat larger. Results are available upon request.

[27]With a similar focus on political differences between owners, we test for a differential PBC in SOEs owned by municipalities from former East Germany, where state ownership of firms was more the norm rather than the exception. We find no economically or statistically significant differences between SOEs from former East and West Germany with respect to cyclical investment patterns. Results are available upon request.

Figure 4: Election cycle in SOE investment – heterogeneity by political majorities in the municipal council



Notes: Coefficient estimates and 95% confidence intervals based on Equation 1, but including interaction terms that separately model the election cycle for SOEs where the owner's council is dominated by (1) left-wing parties or (2) has no clear left or right majority. Observations where the council is dominated by right-wing parties represent the baseline (see Panel (a)). Panel (b) shows the interaction terms. Standard errors clustered by municipality.

backlash from their voter base if they fail to balance the core budget or if they visibly spend significant additional amounts in the core budget before elections and, as a result, use SOEs. Similarly, they may focus more on investment for electioneering purposes, whereas a left-wing council may exhibit a stronger cycle in social spending or public employment.[28]

[28]This relates to an ongoing research project of the authors in which we are investigating a potential PBC in SOE employment and its distributional implications for employees.

The final heterogeneity analysis considers SOE investment separately by economic sector to learn more about which types of SOEs invest more heavily in the months before an election. From a political economy perspective, one would expect increases in SOE investment in the pre-election year to be concentrated in sectors that are particularly visible to voters or that are considered particularly important by (subgroups of) the electorate. We operationalize the analysis into economic sectors by differentiating SOEs in terms of their classification according to the internationally standardized NACE system.

The results are documented in Table 3.[29] A particularly distinct cycle is observed for SOEs in the transportation and storage sector. These are almost exclusively SOEs that provide road passenger transport services or support activities for transportation.[30] The cyclical pattern for these observations is quite pronounced, with per capita investment first falling by -12.1% after an election and then rising sharply by 16.1% in the pre-election year. Other sectors that show a strong cyclical pattern are education, energy, and sector N, which at the municipal level mainly includes landscape service and cleaning activities, the organization of conventions and trade shows, and the activities of employment placement agencies. The SOEs classified in the education sector predominantly provide services in the areas of sports, cultural, and recreation education as well as pre-primary education (e.g., day-care centers). Overall, these results suggest a shift in the portfolio of SOE investments towards more visible categories prior to elections.

Sectors E (water supply, sewerage, and waste management) and R (dominated by sports, amusement, and recreation activities) show a distinct cycle where there is

[29]Figure A2 in the Appendix presents the results, with confidence intervals omitted for better readability. Note that for ease of interpretation and to reduce the complexity of the econometric model, we rely on sample splits for the sectoral analysis.

[30]This finding relates well to the results of Veiga and Veiga (2007), who identify a strong PBC for investment in overpasses, roads, and ancillary works for municipal core budgets in Portugal.

Table 3: Election cycle in SOE investment – heterogeneity by economic sectors (selection)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
NACE sector	D	E	H	L	N	P	R
Election year −3	0.064	-0.008	-0.121	-0.015	0.032	0.024	-0.089
	(0.041)	(0.022)	(0.149)	(0.061)	(0.118)	(0.123)	(0.079)
Election year −2	0.029	0.045**	-0.004	-0.026	-0.011	0.032	0.026
	(0.038)	(0.021)	(0.143)	(0.060)	(0.135)	(0.114)	(0.071)
Election year −1	0.086**	0.053**	0.161	-0.036	0.057	0.094	0.028
	(0.037)	(0.022)	(0.144)	(0.058)	(0.117)	(0.112)	(0.068)
Election year +1	0.018	-0.005	-0.135	-0.037	-0.082	0.016	-0.089
	(0.036)	(0.022)	(0.143)	(0.058)	(0.080)	(0.123)	(0.072)
Baseline investment in EUR per capita	102.17	101.61	44.94	63.66	47.75	6.10	32.64
SOE fixed effects	x	x	x	x	x	x	x
Year fixed effects	x	x	x	x	x	x	x
SOE controls	x	x	x	x	x	x	x
Municipality controls	x	x	x	x	x	x	x
Number of observations	10,633	42,187	1,906	14,785	2,559	1,186	8,116
R-squared	0.703	0.650	0.715	0.647	0.803	0.723	0.650
Description of NACE sector	Energy supply, (electricity, gas)	Water supply, sewerage, waste managem.	Transportation and storage	Real estate activities	Administrative and support service activities	Education	Arts, entertainment, recreation

Notes: *** p<0.01, ** p<0.05, * p<0.1. Results correspond to Equation 1. Separate regressions for each economic sector (measured by the first digit of the NACE classification system). Standard errors clustered by municipality.

a sharp increase in investment figures already two years before an election. While it may be reasonable to increase investment at this early stage in order to spread it out a little, it is not clear why it is concentrated in these two sectors. Finally, one might also expect a cyclical pattern of investment in sector L, which includes SOEs that rent and operate public real estate. Yet, SOE investment in this sector is fairly stable along the electoral cycle. Reasons for this could be that such investments only benefit individual households rather than a larger electoral base and are therefore less attractive for strategic manipulation. Similar to previous papers, we find no pre-election increase for the general public administration sector (e.g., Khemani, 2004).

In terms of absolute magnitude, the electoral cycle has the largest effect for sectors D (energy) and E (water, sewerage, and waste management), as these are the sectors with the highest levels of per capita investment and where the majority of SOEs are active (see Table 3). Hence, while these two sectors dominate the election cycle effect in terms of per capita euro values, it is the transportation and education sectors, which are highly visible to voters and often considered as particularly important in political debates, that show the most pronounced cyclical pattern in relative terms.

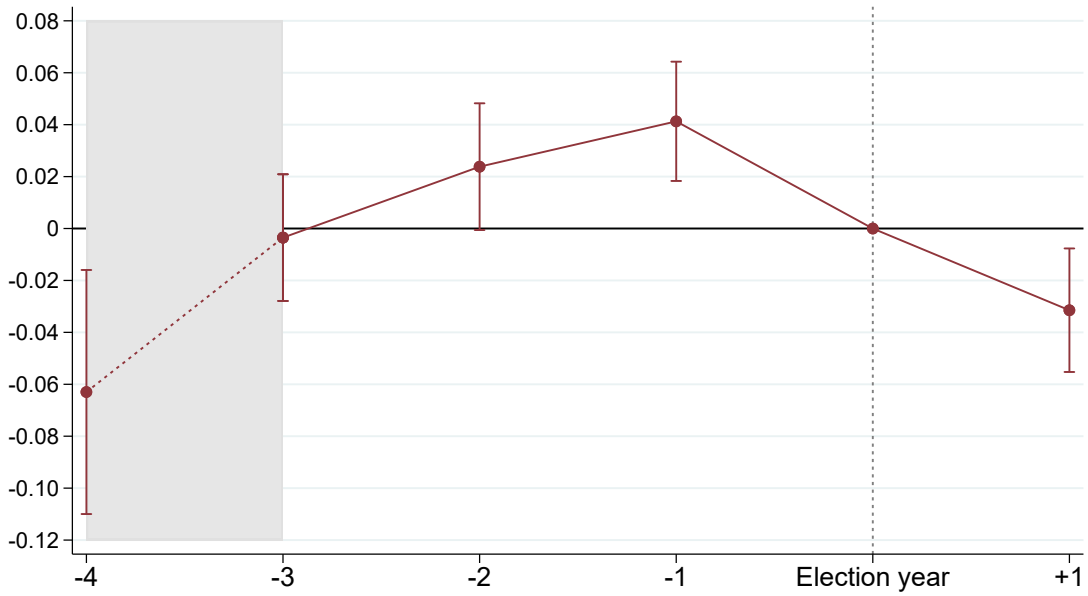
5.3 PBC in Core Budget Investment

In this section, we present additional results that support the comparison of the dynamics of investment decisions along the electoral cycle of SOEs with those of their owners; the core budgets of local governments. By combining both perspectives, that of SOEs and that of core budgets, we seek to understand the relative importance of SOEs for the PBC in public investment in German municipalities that have both instruments at their disposal (i.e., investment by SOEs and core budgets). Our core budget sample consists of all municipalities that manage at least one SOE.[31]

Figure 5 shows the election cycle in public investment for the municipal owners of SOEs. Already two years before an election year, investment is 2.4% higher than in the election year. However, in line with expectations and previous empirical evidence, investments of core budgets are even higher in the pre-election year, in our case by 4.1%, which amounts to EUR 12.90 per capita. After an election year,

[31] An alternative approach would be to estimate the contribution of SOEs to the *total* election cycle of the municipal public sector. The relevant core budget sample in this case would consist of all municipalities in Germany, regardless of whether they own an SOE or not. This would also allow to study whether investment by SOEs complements or substitutes for investment by core budgets. Due to limited data availability, we do not explore this aspect.

Figure 5: Election cycle in public investment – core budgets



Notes: Coefficient estimates and 95% confidence intervals (see also model (2) in Table 4). Standard errors clustered by municipality. The shaded area on the left indicates that the typical election cycle lasts only five years (i.e., from -3 to +1). The identifying variation for the coefficient four years before an election comes only from municipalities in the state of Bavaria as well as from one extended electoral cycle in the states of North Rhine-Westphalia and Brandenburg, respectively (details see Section 4.3). Reduced sample period from 2006 to 2019 due to data availability issues for municipal core budgets.

investments decrease by 3.1%. Table 4 documents the robustness of these results. Model (2) is the main specification, also shown in Figure 5. Model (3) shows that the results are similar when excluding observations that merged, were newly created, or did not own an SOE in *all* years during the considered sample period from 2006 to 2019.

In the next step, we are interested in comparing the magnitude of the PBC in SOEs with that in core budgets to learn about the big picture. Since for the core budgets, we consider all municipalities that are the main owner of at least one SOE, the most comparable model from the SOE analysis is column (4) of Table 2, where we also include minority interests. A back-of-the-envelope calculation suggests that per capita SOE investment (at the municipal level) is EUR 5.77

Table 4: Election cycle in public investment – core budgets

	Unbalanced panel		Balanced panel
	(1)	(2)	(3)
Election year −4	-0.032	-0.063***	-0.061**
	(0.025)	(0.024)	(0.025)
Election year −3	0.003	-0.004	0.004
	(0.012)	(0.013)	(0.013)
Election year −2	0.031***	0.024*	0.031**
	(0.012)	(0.012)	(0.013)
Election year −1	0.052***	0.041***	0.043***
	(0.010)	(0.012)	(0.012)
Election year +1	-0.023*	-0.031***	-0.028**
	(0.012)	(0.012)	(0.013)
Baseline investment, EUR p.c.	314.59	314.59	312.92
Municipality fixed effects	x	x	x
Year fixed effects	x	x	x
Municipality controls		x	x
Number of observations	24,696	24,696	22,140
R-squared	0.630	0.633	0.626

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by municipality. The dummy to capture whether a municipality applies cash or accrual accounting is included in all regressions as investment figures are comparable over time only within the two accounting systems (details see 4.2). Model (3) is limited to local governments that are part of the dataset every year over the considered period. Reduced sample: restricted to the period 2006–2019 and municipalities with at least five thousand inhabitants due to data availability issues for municipal core budgets.

higher in the pre-election year than in the baseline year, compared to EUR 12.90 for core budgets.[32] This would imply that the total effect for the pre-election year is EUR 18.67, of which SOEs account for 30.9%.

There are a number of issues that limit the comparability of the figures discussed above, some of which we can address, and others for which we can only get a rough idea about their impact. First, data on core budget investment are only available for a reduced period from 2006 to 2019 and for municipalities with at least 5,000 inhabitants. The underlying sample for SOEs is therefore somewhat

[32]This calculation compares only the figures for the pre-election year, for which we find robust effects for both samples.

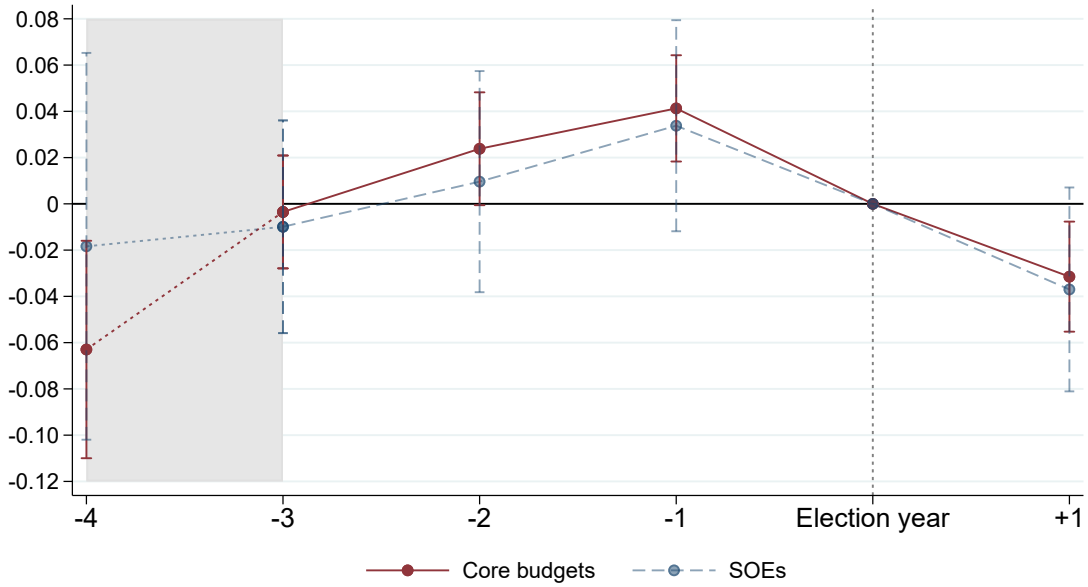
larger. To address this issue, we re-estimate the relevant SOE model, restricting the sample to the years and owners included in the core budget analysis. Since municipalities manage on average 2.5 SOEs, we also aggregate SOE investment to the municipal level to improve comparability.[33] A second issue is already briefly discussed in Section 4.1, namely that average per capita investment by SOEs in our sample is significantly below the population average (EUR 150 versus EUR 360 at the municipal level). Assuming that the relative investment dynamics along the electoral cycle are the same for our sample and the full sample, we are significantly underestimating the election cycle of SOEs in per capita terms. As a simple, albeit unsatisfactory, solution, we can multiply our effects by per capita investment in the full sample to get an idea of what the true effect might be for SOEs.[34]

Figure 6 shows the results for both the core budget analysis discussed above and the adjusted SOE analysis at the municipal level: The pre-election year effect for SOEs is EUR 5.11 (or 3.4% in relative terms), similar to the effect estimated at the firm level and for the larger sample. All in all, simple back-of-the-envelope calculations then suggest that we significantly underestimate the *total* PBC in public investment when only considering core budgets: The *total* effect for the pre-election year is on average more than a third (39.6%) higher when SOEs are also included in addition to the core budgets. Using the per capita investment figures for the *full* SOE sample as a baseline, this figure rises to 94.8% (i.e., the effect of the election cycle in euro values is almost as large for SOEs as for the core budgets).

[33] In particular the latter adjustment significantly reduces the precision of the SOE estimates as we can no longer control for firm-specific characteristics.

[34] To get an idea of the validity of such a solution, we compare the results of a regression that we can run on the full sample with the results using our sample and the same specification (i.e., absolute instead of per capita investment and excluding all owner-level control variables). This analysis shows a pre-election year effect that is almost identical for the full sample and our sample. Moreover, the effects for the earlier years in the electoral cycle are negative for the full sample, making the cyclical pattern even more pronounced than in our main analysis. Results are available upon request.

Figure 6: Election cycle in public investment – core budgets and SOEs



Notes: Figure based on Equation 1 but at the municipality level (i.e., excluding firm-level controls for the SOE regression and using aggregated investment figures for SOEs). The shaded area indicates that the typical election cycle lasts only five years. The identifying variation for the coefficient four years before an election therefore only comes from municipalities in the state of Bavaria as well as from one extended electoral cycle in the states of North Rhine-Westphalia and Brandenburg, respectively. Reduced sample: restricted to the period 2006–2019 and municipalities with at least five thousand inhabitants due to data availability issues for municipal core budgets. Baseline investment of SOEs (core budgets) is EUR 150.26 (EUR 314.59) per capita.

The assessment, that we underestimate the total PBC in municipal investment by about one third if we focus only on core budgets can therefore be taken as a lower bound estimate. These conclusions apply to the sample of municipalities that are the main owners of at least one SOE. In sum, our results on public investment through SOEs and core budgets suggest that both are attractive instruments for politicians in the sense that both are used strategically in the context of municipal elections in order to secure the positions of politicians' and possibly also SOE managers.

6 Discussion and Conclusion

We examine the investment behavior of the public sector at the municipal level in Germany when two instruments are available: SOEs and the core budget of governments as the municipal owners of SOEs. While SOEs are influenced by public decision makers in their agenda setting and are in principle part of the public sector, their role and activities are much less frequently discussed in public and academic debates or in official statistics, which typically concentrate on governments' core budgets. We argue that the relatively hidden financing activities of SOEs, among other things, make them particularly attractive as an instrument for electioneering and investigate whether SOEs' investment dynamics follow the electoral cycle of their owners, with higher investment in the run-up to an election in order to increase the re-election chances of incumbent politicians.

Our empirical strategy exploits the fact that council election years differ across German states, allowing us to disentangle election-induced investment increases from general trends over time. Using administrative microdata on both SOEs and core budgets over a maximum period of 18 years (2002–2019), we identify robust PBCs in both instruments that are of similar magnitude in relative terms: Per capita investment by SOEs (core budgets) is 3.4% to 4.1% (4.1%) higher in the year preceding an election, relative to the election year that serves as our baseline in an event study modeling the entire electoral cycle of local governments. Various robustness tests and heterogeneity analyses support the interpretation that public investment – through both SOEs and core budgets – is strategically used to improve the re-election prospects of incumbent counselors.

Our results speak in favor of the hypothesis that municipal council elections are the driving force behind the identified dynamics in public investment. This leads us to conclude that political influence, not just market forces, has a significant impact on SOE investment. Previous research has shown that this is likely to lead

to inefficiencies (e.g., Alok and Ayyagari, 2020). Following Asatryan et al. (2022), we also argue that heavy use, combined with the politicization of SOE activity, leads to significant intransparency with respect to public sector finances. From a policy perspective, this calls for careful attention to the institutional details that regulate the outsourcing behavior of core budgets in order to avoid inefficiencies and deficiencies in the effective governance of outsourced units.

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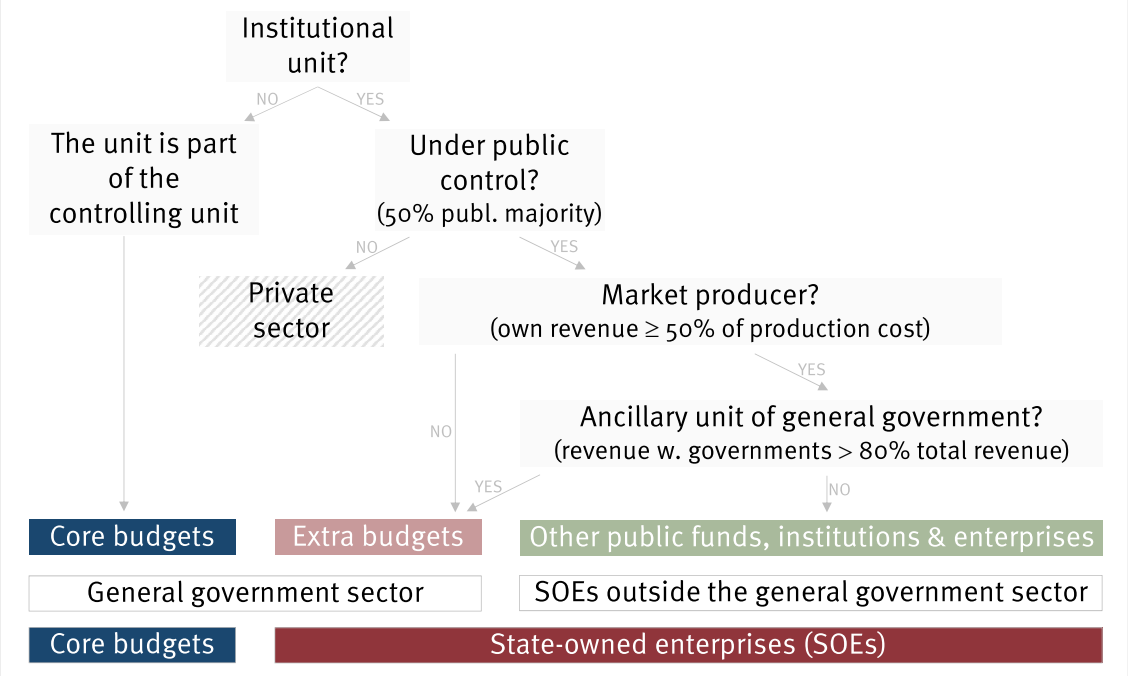
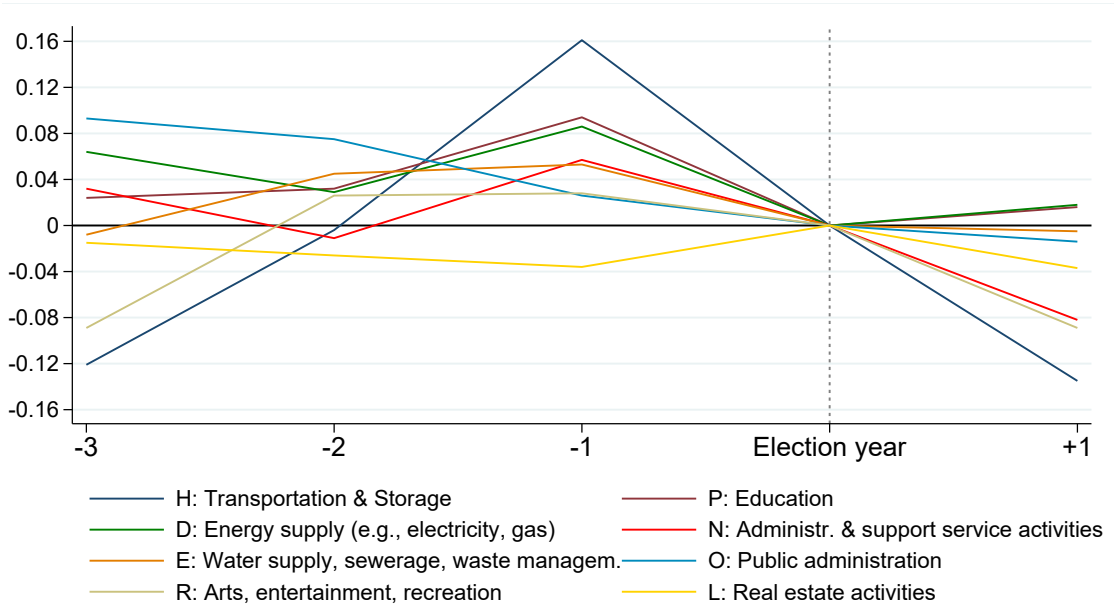
Appendix

Figure A1: Categorization scheme for government sector accounts



Notes: Own figure based on Schmidt et al. (2017). The figure summarizes the criteria for the classification of public institutional units (any institution or enterprise subject to some form of government involvement) into core budgets, non-market-producer SOEs, and market-producer SOEs. Ancillary units of general government are companies that generate more than 80% of their revenue by making business with government units.

Figure A2: Election cycle in SOE investment – heterogeneity by economic sectors (selection)



Notes: Coefficient estimates based on Equation 1. Separate regressions for each economic sector (measured by the first digit of the NACE classification system). Confidence intervals omitted for better readability (detailed regression results are documented in Appendix Table 3).

Table A1: Election cycle in SOE investment – individual states excluded

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	14)
Election year −4	0.013	0.013	-0.002	0.009	0.017	0.008	0.017	0.016	0.014	0.019	0.015	0.014	0.016	0.014
	(0.031)	(0.032)	(0.033)	(0.037)	(0.034)	(0.032)	(0.032)	(0.043)	(0.032)	(0.033)	(0.032)	(0.032)	(0.031)	(0.032)
Election year −3	0.008	0.008	-0.001	0.004	0.014	0.004	0.013	0.010	0.008	0.017	0.006	0.009	0.006	0.006
	(0.017)	(0.018)	(0.019)	(0.018)	(0.021)	(0.018)	(0.018)	(0.018)	(0.017)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
Election year −2	0.030*	0.025	0.026	0.037**	0.027	0.029*	0.031*	0.033*	0.031*	0.041**	0.028*	0.029*	0.031*	0.030*
	(0.016)	(0.017)	(0.018)	(0.017)	(0.019)	(0.016)	(0.017)	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Election year −1	0.041**	0.040**	0.038**	0.048***	0.043**	0.039**	0.037**	0.038**	0.042**	0.048***	0.038**	0.038**	0.041**	0.039**
	(0.016)	(0.017)	(0.018)	(0.017)	(0.018)	(0.017)	(0.018)	(0.017)	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)
Election year +1	-0.003	-0.005	-0.027	-0.001	0.010	-0.007	-0.005	0.007	-0.005	0.005	-0.005	-0.000	-0.001	-0.003
	(0.016)	(0.018)	(0.017)	(0.016)	(0.018)	(0.016)	(0.017)	(0.018)	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)
SOE fixed effects	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Year fixed effects	x	x	x	x	x	x	x	x	x	x	x	x	x	x
SOE controls	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Municipality controls	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Number of observations	103,412	99,869	96,257	86,334	95,735	93,949	80,098	93,092	100,912	98,482	100,111	96,589	99,740	99,776
R-squared	0.766	0.765	0.766	0.750	0.765	0.756	0.788	0.767	0.766	0.765	0.769	0.768	0.768	0.767
Excluded state	–	*Schleswig-Holstein*	*Lower Saxony*	*North Rhine-Westphalia*	*Hesse*	*Rhineland-Palatinate*	*Baden-Württemberg*	*Bavaria*	*Saarland*	*Brandenburg*	*Mecklenburg-Vorpommern*	*Saxony*	*Saxony-Anhalt*	*Thuringia*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Results correspond to Equation 1. Standard errors clustered by municipality. Column (1) represents the main specification (see also model (3) in Table 2). Columns (2) to (14) exclude all observations that belong to the respective state one by one.

Table A2: Summary statistics – core budgets

Variable	N	Mean	Std. dev.	1st perc.	Median	99th perc.
Population	24,735	29,097	67,249	4,902	14,088	294,627
Share population >65 years	24,735	0.212	0.032	0.149	0.209	0.309
Share working age population	24,735	0.617	0.022	0.554	0.618	0.674
Population density	24,735	485.3	476.8	45.2	314.7	2,271.1
Turnout (in previous election)	24,735	0.531	0.073	0.369	0.529	0.710
Share of seats in local council by political party						
CDU/CSU	24,735	0.357	0.131	0.000	0.360	0.667
SPD	24,735	0.241	0.122	0.000	0.236	0.545
FDP	24,735	0.038	0.048	0.000	0.025	0.196
B90/GRÜNE	24,735	0.066	0.067	0.000	0.062	0.244
PDS/DIE LINKE	24,735	0.027	0.064	0.000	0.000	0.306
AfD	24,735	0.004	0.020	0.000	0.000	0.108
Others/indep. counselors	24,735	0.267	0.213	0.000	0.222	1.000
Accrual accounting system	24,735	0.493	0.500	0	0	1

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. Reduced sample: restricted to the period 2006–2019 and municipalities with at least five thousand inhabitants due to data availability issues for municipal core budgets.

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