The effect of board members' education and experience on the financial performance of German state-owned enterprises

Marcus Sidki[1] · Lara Boerger[1] · David Boll[1]

Abstract

Within state-owned enterprises (SOEs), supervisory board mandates are often given to politicians, many of whom are selected through political processes in which competence is not necessarily the decisive factor. This paper analyzes the impact of this form of governance, examining the business competence level of supervisory board members and their influence on the financial performance of 58 state-owned utility companies in Germany from 2011 to 2016 by applying OLS regression. For this purpose, the biographical backgrounds of 3350 supervisory board members were compiled to discern their education, management, and industry experience. Contrary to our hypotheses, the empirical analyses show no effects for any of the competence dimensions on companies' profitability. In a more detailed analysis, we find that board members with management experience from outside the energy sector seem detrimental to the company, which may indicate self-overestimation bias. This result is robust across different specifications and opens up an interesting new approach to analyzing the impact of board member competence on firm performance. The insignificance of the other competence areas indicates a rather low impact of supervisory boards on SOEs based on their unique institutional setting and in comparison to private sector corporate governance. Overall, this study contributes to both scholars and practitioners by providing new insights in the field of public corporate governance, focusing on the unique situation of the competence of politically connected boards and their influence on SOEs.

Keywords Public corporate governance · State-owned enterprises · Supervisory boards · Board competence · Experience · Overconfidence bias

JEL Classification G30 · H19 · L32

✉ Marcus Sidki
  marcus.sidki@hwg-lu.de

1   Ludwigshafen University of Applied Sciences, Ernst-Boehe-Strasse 4, 67059 Ludwigshafen, Germany

1 Introduction

Corporate governance refers to the structure and underlying processes for monitoring the direction and management of a company in order to ensure that the company's objectives are achieved in the most effective manner. This does not only apply to companies in the private sector, but also to state-owned enterprises (SOEs). In this sense, the governance of SOEs is of particular importance to governments and society and follows the objective of ensuring the enterprises' efficiency and effectiveness in the fulfilment of their (public) tasks.

The supervisory board plays a central role for corporate governance. Supervisory board members are responsible for e.g. monitoring the management or voting on decisions of high importance. They also serve as source of advice and counsel for the management. In Germany, politicians often have supervisory board control over SOEs.[1] This practice is intended to ensure the democratic legitimacy of SOEs—politicians act as citizens' representatives and exert direct influence over the enterprise (Papenfuß, 2013b). There are, however, increasing indications that these members do not have the necessary qualifications and competencies to fulfill their mandate (Hau & Thum, 2009; Klimke-Stripf & Morner, 2018; König & Wruuck, 2011; Weiblein, 2011). Thus, democratic legitimization must not compromise the main functions of the supervisory board: namely, to assist the board in an advisory capacity and to control its actions.

Tremml et al. (2021) examine the impact of board behavior in state-owned energy companies and find that public ownership structure negatively influences the strategic control of the supervisory board. Similarly, Klimke-Stripf and Morner (2018) find in interviews with CEOs, supervisory board members, and municipal employees that candidates' professional competence is less important than their political commitment and affiliation during the selection process. It is not that competence is seen as unimportant, but parliamentary groups do not always have suitable candidates who can bring the necessary skills to the table.

While state organizations do not primarily look for professional expertise when filling supervisory board mandates, it remains unclear what effects this structure has on SOEs. With the exception of financial institutions, there is no analysis in the academic literature known to the authors on whether this special political connectedness in the supervisory boards of SOEs exerts an influence on them. This paper therefore addresses this gap in the literature by examining the research question of whether the business competence of supervisory board members of SOEs has an effect on their financial performance. More specifically, the study aims to identify possible competence differences between politicians and non-politicians serving on supervisory members, to analyze their impact on SOEs and whether other competence-based performance influences exist. Some related studies can be found in corporate governance research, which—following the financial crisis—has increasingly

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[1] This is not a uniquely German phenomenon. In other countries, such as Sweden or the Netherlands, politicians are increasingly represented on the supervisory bodies of state-owned enterprises (Bergh et al., 2019; Voorn et al., 2020).

focused on the role of supervisory boards as control bodies in financial institutions (Fernandes et al., 2018). Researchers have indicated that banks whose supervisory boards have less financial experience suffered greater losses during the crisis (Fernandes et al., 2016; Francis et al., 2012; Hau & Thum, 2009). Moreover, a lack of professional competence can increasingly be observed in state-owned banks. For example, Hau and Thum (2009) find that supervisory board members of German state-owned banks had comparatively less management and industry experience, with the latter having a particularly negative impact on their financial performance during the crisis.

These results underline the need to examine current staffing practices at German SOEs. Since financial institutions have unique characteristics that can be transferred to companies from different sectors only to a limited extent, it is necessary to look at other areas of general interest. Therefore, this paper addresses what influence the competence of supervisory board members has on the financial performance of state-owned utility companies.

Methodologically, we follow the research design of Hau and Thum (2009) and examine the biographical background of 3350 supervisory board members of 58 state-owned utility companies in Germany from 2011 to 2016. To obtain a measure of monitoring potential for supervisory boards, eight different biographical criteria are defined and used as proxies for boardroom competence. The variables capture board members' (1) educational attainment as well as their (2) management and (3) industry experience. Company performance is quantified by three different profitability indicators: return-on-assets (ROA), return-on-equity (ROE), and profit per employee. Additionally, to ensure a comparable performance measurement and justify the nature of state-owned enterprises, the business areas in which the analyzed utility companies operate are identified and controlled for in the regression analysis.[2]

In the context of this study, we expect a positive relationship between the competence of supervisory board members in utility enterprises and their performance. However, the results of the regression analysis cannot confirm this assumption, as no significant effects of the competence variables on firm performance can be found. Yet, several models show significant negative effects of the variable management experience on firm performance when industry experience is taken into account simultaneously. In conclusion, a high share of supervisory board members with management experience but without experience from the relevant industry seem to have a particularly negative influence on the company's performance.

The study contributes to the field of public corporate governance research by, firstly, filling existing gaps in the literature on the functioning of SOEs taking into account their specific institutional setting within the political sphere. Secondly, findings on this matter so far exist mainly for financial institutions. In this study, this

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[2] SOEs usually provide market goods and can generate profits, but they might also have a mandate—in contrast to private companies—to provide non-market goods in the sense of general services of interest (Mühlenkamp, 2019). For reasons of favorable taxation exclusively available to state-owned enterprises, public utilities in Germany often operate in holding structures that also contain businesses that regularly operate at a loss such as public transportation or public recreational facilities (Helm & Bischoff, 2020).

is extended to companies operating in the field of energy supply, which is a typical task of SOEs in the context of providing services of general interest. Thirdly, we expand the quantitative research in this area by strengthening the understanding of how relevant business competencies are distributed among politically connected and non-political board members and whether they exert any influence on the SOEs' financial performance. By this, we broaden the current understanding of competency and skills-based corporate governance research.

Practitioners are made aware of the impact and role of supervisory boards on state-owned enterprises. In particular, they gain insights on the importance of competencies that need to be taken into account when appointing members to supervisory boards.

For this purpose, Sect. 2 gives an overview of the relevant literature and deals specifically with the three dimensions of education, management experience, and industry experience in more detail in order to develop the literature-based hypotheses. Section 3 starts with a discussion of the particularities of state-owned enterprises in Germany, highlights the impact of this institutional structure from the perspective of principal-agent theory and describes the study design, the data, and the estimation strategy. Section 4 presents and examines the results of the panel regression, and Sect. 5 concludes.

2 Board business competence and firm performance

To date, numerous empirical studies address the importance of board competence and examine its influence on company performance. In most cases, researchers examine the importance of education, experience, or tenure of board members on company performance. An instructive overview is provided by Johnson et al. (2013).

Hau and Thum (2009) published an empirical study in which they addressed the systematic underperformance of German state-owned banks during the financial crisis between 2007 and 2008. Of the 29 largest German banks, state-owned banks recorded asset write-downs and losses that were on average three times as large as those of private-owned banks. At the same time, an examination of the biographical backgrounds of 592 supervisory board members reveals a significant and qualitatively large difference in boardroom competence. Supervisory boards of state-owned banks have lower qualifications in relevant education and less management and industry-related experience, the latter causing a particularly negative impact on bank performance. The authors examined this correlation in more detail using various regression analyses and concluded that the lack of competent board monitoring is a leading explanation for the underperformance of German state-owned banks during the crisis.

Since then, an increasing number of studies have specifically addressed the issue of supervisory board member competencies in the financial industry. In their analysis of 72 publicly listed European banks Fernandes et al. (2016) find that banks with more independent and busy boards had poorer stock returns during the financial crisis and that banks with more board members with industry-related (i.e. financial) experience performed better. In a related literature review, Fernandes et al. (2018)

emphasize that board experience and industry-related (financial) expertise are found to be positively correlated determinants for bank performance. Although corporate boards with less experience overall may not have triggered the crisis directly, the practices of corporate boards appear to have influenced the extent to which firms were vulnerable to the crash (Francis et al., 2012).

In the context of these studies, financial institutions under majoritarian public-sector ownership were more specifically addressed. Importantly, it has been demonstrated that a lack of competencies in the supervisory bodies is even more of a problem for state-owned banks than private ones. König and Wruuck (2011) also reveal that the high losses of some German state-owned banks in the wake of the financial crisis can be attributed to poor supervision. Here, the authors refer to an increasing fragmentation of interests: the participation of a larger number of actors with different interests and incentive structures, e.g., politicians, leads to more difficult decision-making processes—up to complete blockades within committees—and hinders effective management control.[3] A similar conclusion is drawn by Andres et al. (2021), who find a negative impact of board politicization on the performance of Spanish savings banks (*cajas*). Moreover, they observe that political directors with financial expertise do not use their industry knowledge to benefit the banks, whereas their homologs without political connections do.

Besides financial institutions, only a few studies address the role of competence concerning the supervisory boards of SOEs. In one study, Shawtari et al. (2017) examine listed state-owned enterprises in Malaysia, where the government is actively involved. Applying quantile regression estimations for a sample of 169 firm-year observations between 2002 and 2011, the authors conclude that audit committee expertise is negatively related to the performance of the largest decile firms. For the remaining 90%, the authors find no significant results. Menozzi et al. (2012) focus on the influence of politicians on boards of directors among 114 Italian local public utilities between 1994 and 2004. Based on information on 1.630 board members, the authors find that a higher share of politicians on a board harms firm performance.

As mentioned above, there are studies that address board competence—albeit not as a main focus, but as one variable among others. In these cases, the quantification of board *competence* is typically kept simple. Peni (2014), for example, approximates the degree of experience by the number of years an executive has worked in the same position. In a study on financial expertise, Shawtari et al. (2017) model board competence as a dummy variable that is equal to 1 if at least one member of the audit committee is a financial expert. If focus is to be laid on the topics and content of board member experience instead, a detailed survey that includes research into board members' respective biographies is necessary. Unfortunately, data sets of surveys in this field of research are relatively scarce. Güner et al. (2008) analyze the

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[3] The influence of political fragmentation on public enterprises—according to the veto player approach—has also been shown by Boll and Sidki (2021). Data from 8685 municipally-owned enterprises in the period 2002–2014 demonstrates that the high fragmentation of interests among municipal councils is associated with lower investments in municipal enterprises.

impact of board members' financial expertise for a data set of 282 companies over 14 years and find that this competence has a significant effect on corporate decisions—but only in the context of the presence of conflicts of interest. Pereira and Filipe (2018) examine the educational qualifications of board members and whether they affect the performance of 25 Portuguese banks between 2012 and 2014. The authors use three indices as proxies for the educational qualifications and test their influence on the banks' return on average assets and return on average equity. The results show that board members who hold degrees, especially from prestigious foreign business schools, have a significantly positive impact on firm performance. Volonté and Gantenbein (2016) analyze the relationship between board members' human capital, consisting of international experience, industry know-how, CEO experience and financial know-how, and firm performance—as measured by Tobin's Q—for a sample of 560 firm-year observations in Switzerland for the years 2005, 2007 and 2009. The authors find empirical evidence for an influence of different human capital categories conditional on corporate strategy: industrial know-how has a negative significant impact on firm performance in diversified firms, while international experience is positively associated with increasing levels of internationalization. CEO experience, on the other hand, is negatively related to firm performance in internationalized firms.

In the following, we adopt Hau and Thum's (2009) methodological approach to measuring competence, as they apply a broad definition structured into three categories. Correspondingly, we use the dimensions education, management experience, and industry experience to quantify board competence and examine the significance for company performance.

2.1 Education

Education refers to a person's educational background and academic career and is of great importance in the labor market. Under normal circumstances, higher degrees qualify people for more demanding jobs that are accompanied by higher wages. Especially in corporate governance, well-educated leadership is essential: a high educational level enables a better understanding of complex situations and leads to better judgments of strategic decisions. This characteristic is essential in the case of energy companies as the energy market is highly regulated and structurally complex. From these considerations, we conclude on the first hypothesis:

H1 The educational background of supervisory board members positively impacts firm performance.

Several studies connect corporate governance to executive education. First, Jalbert et al. (2002) demonstrate a significant positive relationship between the educational background of CEOs and a firm's ROA and Tobin's Q for the 500 largest US companies from 1972 through 1996. Fernandes et al. (2016) and Pereira and Filipe (2018) focus on supervisory board members and find that their level of education also positively influences the performance of financial institutions in some of the

authors' model specifications. However, there are also studies that cannot confirm this connection. Hau and Thum (2009) find no significant relationship for this category in their analysis of German banks. Jin and Mamatzakis (2018) even find a partially negative effect between the educational background of supervisory board members and bank performance for Chinese banks, but the results should be interpreted with caution because the robustness of these results cannot be demonstrated.

2.2 Management experience

The category management experience refers to whether a person has already worked in management positions during their professional career, including top management positions on the board of directors of a company or mid-level positions as a team or department leader. Such experience is highly advantageous for supervisory board members, as these persons are more familiar with the work of the board. It can equip board members with many skills that make them more effective in their core task of monitoring the activities of managers. We follow this intuitive reasoning and formulate the following hypothesis:

H2 The management experience of supervisory board members positively impacts firm performance.

Empirical evidence on management experience is rather sparce, however, as this dimension is usually not explicitly addressed. In one of the few available studies, Volonté and Gantenbein (2016) analyze the role of a director's experience for a sample of 4021 directorships at Swiss companies, where experience is indicated by whether CEOs have executive-level experience or prior leadership experience as CEOs. The authors find that international experience to be positively related to firm performance, while preceding CEO experience is negatively related. Also, Hau and Thum (2009) find no significant effects of management experience on company performance in their analysis of supervisory board members of German banks.

2.3 Industry experience

Industry experience is a relevant variable in the assessment of competencies. People have industry experience if they have previously worked in the same industry in which they are now in corporate governance. In addition to the expertise that experienced board members can contribute to their board engagement, they are likely to have professional networks that are useful to the company. This lead to the following hypothesis:

H3 The industry experience of supervisory board members positively impacts firm performance.

In comparison to other relevant dimensions of competence, industry experience has received a meaningful amount of attention in corporate governance research.

Empirical studies show that boards that exhibit high levels of industry experience among members positively impact corporate performance (Custódio & Metzger, 2013; Güner et al., 2008; Meyerinck et al., 2016). The same can be shown for the particular case of supervisory board members. Hau and Thum (2009) find that the financial expertise of the supervisory board members of German banks correlates with crisis performance at a 5% significance level.[4] Jin and Mamatzakis (2018) also find a positive and, in some models, significant relationship in their analysis of Chinese banks. Overall, the relevant literature shows comparatively robust results and indicates that the industry experience of supervisory board members has a positive influence on company performance (Fernandes et al., 2016; Papakonstantinou, 2008).

3 Institutional setting, data and methodology

3.1 Institutional setting

SOEs are hybrid organizations characterized as part of the public sector but not the government sector in the narrow sense. German federal statistics define a state-owned enterprise as an institution with more than half of its ownership, i.e., its nominal capital or corporate control, held by one or more public organizations (Wägner, 2017).[5] As of 2018, this included 18,655 entities in Germany, most of which were under municipal ownership (around 88%). Furthermore, around 29% of these SOEs operate in a public law legal form vis-à-vis 71% of private law-based companies such as limited liability companies (LLCs) or stock corporations. SOEs are generally engaged in a variety of industries, most noticeable in the electricity and heating sector, the water supply and wastewater disposal sector, the housing sector, the hospital sector, and the cultural sector.

When public enterprises adopt private law legal forms, they are obliged to follow the organizational model of the German two-tier system. Compared to the one-tier system of Anglo-Saxon origin, German corporate governance distinguishes between the management board and the supervisory board (Hopt, 2015). The management board leads the company and manages the operational business. The supervisory board, on the other hand, advises and monitors the executives.[6] In contrast to managers, the monitoring body is considerably more substantial—the supervisory board consists of a minimum of three and a maximum of 21 members, depending on the

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[4] If the object of study is financial institutions, industry experience and financial expertise can be equated.

[5] While some German SOEs apply accrual accounting, the vast majority follow commercial accounting regulations (Schmid, 2011). All figures represented here only refer to the latter.

[6] In this paper, the controlling body is always explicitly referred to as the *supervisory board*. When *board* is mentioned alone, the entire corporate governance is meant. This difference is particularly relevant when comparing results from different countries and institutional backgrounds (see Sect. 3).

company's stated capital. At larger companies, half of the supervisory board is composed of representatives of the owners, and half represent the employees.[7]

Additionally, public corporate governance entails an institutional peculiarity: it is common for the supervisory boards of state-owned enterprises to be staffed mainly by politicians. For example, municipal supervisory board mandates are to a great extent awarded to city council members according to party proportional representation (Klimke-Stripf & Morner, 2018). In theory, this practice is supposed to ensure the democratic legitimacy of state-owned companies, in which politicians act as citizen representatives and exert direct influence over them (Papenfuß, 2013b). In practice, supervisory boards serve as a popular instrument of participative management for state organizations, but the appointment of politicians to supervisory board positions tends to be viewed with skepticism by the public (Sidki & Boll, 2019).

A comparison of the ten largest German cities from 2013 shows an overall average of 47% politicians on the supervisory boards of companies with municipal participation (Papenfuß, 2013a). Proeller and Krause (2016) also examine different legal forms and find that the supervisory boards of limited liability companies consist on average of 58.5% politicians, while stock corporations have a proportion of 42.4%.[8] This finding gives rise to the assumption that the average quota of politicians on supervisory boards is considerably higher than 50% if smaller municipalities and districts are also included.

There is significant variation among SOEs in both studies, with some having only politicians on their supervisory boards while others also rely on non-political directors. This finding is critical because it shows that not all public companies comply with the recommendations of the *Public Corporate Governance Kodex* (PCGK). The PCGK is a nonbinding set of guidelines for the responsible organizational management of public administrations and state-owned enterprises in Germany. It aims to ensure the effectiveness, efficiency, and sustainability of public sector organizations in the fulfillment of public tasks and to guarantee actions in the public interest and an appropriate level of influence from the public sector. The recommendations of the PCGK on the organization of the supervisory board contain guidelines on, e.g., the composition, members, establishment of rules of procedure, and the implementation of regular self-evaluations. Furthermore, it explicitly emphasizes the importance of competencies in the composition of the supervisory board (Expertenkommission D-PCGM, 2020). The recommendations indicate that the supervisory body should be composed so that its members have the knowledge, skills, and professional experience required to properly perform their supervisory duties. Specifically, the appointment of at least one external member with proven professional aptitude or industry knowledge is recommended.

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[7] Co-determination depends on the legal form of the company and the number of employees. In most cases, the composition of the supervisory board is governed by §7 Mitbestimmungsgesetz [Co-Determination Act] or §4 Drittelbeteiligungsgesetz [One-Third Participation Act].

[8] The evaluation is based on a survey of all managing directors of municipal enterprises with more than 200,000 inhabitants, corresponding to 39 cities.
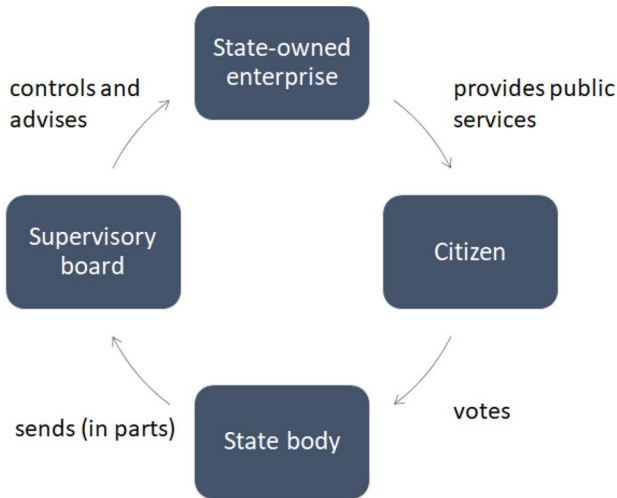
Fig. 1 The supervisory board as an institutional structure

Figure 1 depicts the institutional setting of the supervisory boards of state-owned enterprises. Compared to private sector companies, they exhibit unique multi-level agency relationships that form a series of informational (dis)advantages and resulting incentive structures (Mühlenkamp, 2006). Citizens of a municipality, state, or nation act as principals to the members of the state body (e.g., parliament or municipal council) with the expectation that politicians affiliated with these bodies will behave in the citizens' best possible interest when democratically legitimized by an election. On the other hand, citizens demand and consume the services of general economic interest (SGEI) offered by various SOEs. As representatives of citizens' interests, politicians in the state body possess informational advantages such that citizens cannot fully detect whether politicians have genuinely fulfilled their expectations.

From this informational asymmetry arises a problem—politicians are incentivized to follow a political agenda rather than act on behalf of the electorate. In general, a politician is rarely a completely well-meaning social planner (Alesina & Tabellini, 1990). Many politicians are also driven, at least to some extent, by self-interest. The pursuit of reputation, money, power and, last but not least, the desire for re-election influence political action. This can lead to misguided behavior, especially in areas that voters consider most important (Rogoff, 1990). As agents of citizens, politicians, who are members of parliaments or municipal councils, also act as principals to the managers of SOEs since they are often appointed to their supervisory boards. These assignments revolve around representing the public owner on the board, but politicians can again exploit their informational advantages vis-à-vis citizens. The institutional setting of SOEs is completed by the managers, who act as agents to their public shareholder(s) with respective informational advantages when reporting to the public and to the politicians on their supervisory boards (Boll et al., 2020).

In summary, there are some specificities for the German use case considered here, such as the two-tier board system or the practice of appointing members to the boards described above. It can therefore not be ruled out that in other countries with different institutional settings the results of a comparable study would be different. However, the measurement of the business competencies of SOE board members—the variables of interest in this study—is carried out in a comprehensive manner in which country-specific factors do not play a role. Thus, it can be assumed that the results are at least to a certain extent transferable to other countries.

3.2 Data

We address our research question by drawing upon the biographical information of supervisory board members at state-owned utility companies in Germany. To this end, we collected data on the annual financial statements of all German utility companies in the period 2011–2016 with a balance sheet total of at least EUR 250 mn in 2016 and more than 50 percent of public ownership.[9] The data was retrieved from the Orbis database. We removed all companies with incomplete data during the period of investigation, resulting in 58 companies.[10] Next, the biographical data of the supervisory board members for each firm year was collected, resulting in 3350 observations. Using the dimensions of Hau and Thum (2009), the data contains information on education, management, and industry experience to quantify competence within the supervisory board. Biographical information was collected analyzing publicly available online exposés, CVs, and newspaper articles about board members—following the guiding questions:

(1) Education

    a. Does the board member have a university degree?
    b. Does the board member have a Ph.D.?
    c. Does the board member have a degree in business or technology (university degree or vocational training)?

(2) Management Experience

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[9] The threshold of more than 50% in public ownership corresponds to the definition of SOEs commonly used in the European Union's (2013) European system of accounts. Furthermore, the restriction to companies with a balance sheet total of at least EUR 250 mn refers to the classification as "large corporations" found in the literature (Giovannini, 2013). For example, certain legal regulations (e.g. the German Act on Private Equity and Venture Capital Companies (UBGG)) become valid from this threshold.

[10] A total of 11 companies had to be removed from the data set. Only companies that have been active since at least 2011 and are legally obliged to have a supervisory board were included. Removed were: Trianel GmbH, Bayerngas GmbH, Gas-Union GmbH, Stadtwerke Stuttgart GmbH, EAM GmbH & Co KG, Energieversorung Mittelrhein AG, and Rhönenergie Fulda GmbH. Due to missing data, the following three companies were also excluded: Dortmunder Stadtwerke AG, Stadtwerke Reutlingen GmbH, and Stadtwerke Solingen.

    a. Does the board member have management experience, e.g., as a team or department leader?

    b. Does the board member have top management experience, e.g., as an executive or mayor?

(3) Industry Experience

    a. Does the board member have professional experience as an auditor, tax advisor, or consultant?

    b. Does the board member have work experience in the energy sector?

    c. Has the board member previously worked for the company?

All questions were coded with binary variables (Yes = 1 and No = 0) that were then computed into an overall mean experience score. Thus, an index value between 0 and 8 could be achieved. In order to analyze the impact on company performance, the index data must be aggregated at the company level. For this purpose, averages of the index values for the various supervisory boards were calculated. Missing values were taken into account by using the mean values of existing data in the respective supervisory board.

In Germany, the supervisory board consists of representatives of the shareholders and, in co-determined companies, representatives of the employees. As the information on employee representatives is rarely publicly available, only the employer side could be considered. However, the object of interest remains unaffected, as the mandates of employers' representatives are often given to politicians, whose influence on board competence and the ensuing effects on company performance are the main focus of this study. Also, as major decisions are usually made at the highest level, the data addresses only the supervisory board members of the respective parent companies.

3.3 Estimation strategy

The linear regression analysis is based on the following model:

$$PERF_{it} = \beta_0 + \beta_1 \ln(1 + INDEX_{it}) + \beta_2 DUMMY\_POL_{it} + \beta_3 OWNERSHIP_{it}$$
$$+ \beta_4 PUBL\_SERV_{it} + \beta_5 SIZE + \beta_6 YEAR_t + \epsilon_{it}.$$

The variable $PERF_{it}$ denotes three different measures to quantify company performance: the profit ratios return-on-assets (ROA), return-on-equity (ROE), and profit per employee. All dependencies are calculated using annual net profit after taxes.[11]

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[11] "Other operating income" and "other operating expenses" have therefore not been included. This exclusion is highly relevant in the case of public energy companies, as large percentages of their profits are often directly distributed as dividends to the municipal owners, in which case they are no longer included in annual profit statements.

INDEX$_{it}$ represents the four competence indices: *Index_education* relating to the score of education-based competencies, *Index_management* relating to the score of management experience-based competencies, *Index_industry* relating to the score of industry experience-based competencies and finally *Index_total* as total competence score including all of the above. In order to obtain a more normally distributed measure, we use the log transformation given by $\ln(1 + INDEX_{it})$.

The dummy variable *DUMMY_POL*$_{it}$ measures whether the owner or capital side of the supervisory board consists exclusively of politicians. The variable takes the value 1 if—contrary to the recommendation of the German *Public Corporate Governance Kodex*—only politicians hold a mandate and 0 if at least one board member is not politically connected.

The vector *OWNERSHIP*$_{it}$ contains all control variables for measuring ownership structure. This measure includes *share_priv*, i.e., the share of private owners,[12] *numb_publ*, i.e., the number of public owners, and the dummy variable *main_owner* that tests whether a single public institution owns more than 50% of the shares.

The dummy variable *PUBL_SERV*$_{it}$ indicates whether the company additionally provides typical loss-generating services. It takes the value 1 if the services of local public transport or public recreational services are offered by the company, and 0 otherwise. Since state-owned enterprises are not primarily profit-oriented but are also obliged to provide services of general interest, it is difficult to measure performance solely based on profitability indicators. To address this problem, the additional business areas in which the analyzed companies are active were also surveyed based on annual reports. Thus, we were able to determine that local public transport and the provision of public recreation facilities must be taken into account when using financial ratios as dependent variables since these business areas usually generate deficits that impact companies' overall financial results.

The variable *SIZE* controls for possible effects resulting from differences in the size of the SOEs in the sample. We measure firm size by the log of total sales of each firm year.

Finally, year fixed effects are included to control for market fluctuations.

As only utility companies are analyzed, no sector fixed effects need to be included. Fixed effects at the company level are also integrated into some model specifications. However, these models are questionable in our case, as our variable of interest changes little over time, and differences can no longer be taken into account.

3.4 Descriptive statistics

Table 1 provides descriptive statistics for the individual-level index data. Biographical background information could be found for most members. The number of missing values in all categories is about 9%, meaning that a total of 3,035

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[12] Although owned by municipalities, we count the involvement of the German investment and technical consulting company Thuega as private ownership, since its business model is more comparable to that of a private investor.

**Table 1** Competencies of politically connected members and others

	All members		Politically con-nected members		Other members		Mann–Whitney-U-Test/Wilcoxon-Test
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	N	Mean	N	Mean	N	Mean	HO: (4) = (6)
Education							
Index_1a	3142	0.80	2428	0.79	710	0.86	0.000
Index_1b	3193	0.21	2459	0.19	730	0.27	0.000
Index_1c	3152	0.46	2442	0.41	706	0.64	0.000
Management experience							
Index_2a	3169	0.66	2445	0.60	720	0.84	0.000
Index_2b	3179	0.40	2446	0.33	726	0.63	0.000
Industry experience							
Index_3a	3159	0.14	2450	0.12	704	0.22	0.000
Index_3b	3187	0.23	2468	0.13	717	0.57	0.000
Index_3c	3187	0.05	2468	0.03	717	0.14	0.000
Competence indices							
Index_education	3106	1.48	2403	1.39	699	1.78	0.000
Index_management	3147	1.06	2423	0.94	720	1.48	0.000
Index_industry	3149	0.42	2443	0.27	704	0.93	0.000
Index_total	3035	2.96	2355	2.60	678	4.22	0.000

The data includes all owner representatives of the 58 largest state-owned energy companies from 2011 to 2016. A total of 3350 observations were collected. The biographical information of the supervisory board members is aggregated into four measures of supervisory board competence, similar to the study by Hau and Thun (2009): educational index, average management experience, average industry experience, and aggregate total experience

observations out of 3350 could be collected entirely and summarized in the variable *index_total*. Since supervisory board members often retain their mandate for several years, individuals may be represented multiple times.

As suspected, Table 1 shows that supervisory board mandates are predominantly given to persons with a political background. About 75% of members have or have had a political mandate in addition to their supervisory board mandate, meaning that only every fourth mandate was awarded to a non-politician. These statistics are higher than the results of Papenfuß (2013a) and Proeller and Krause (2016) because former politicians were also considered. If only current politicians are counted, a large share of political entanglements remains unconsidered.

However, it should be noted that the allocation of mandates is handled very differently. Examining the data at the firm level reveals that around one-third of the companies award their supervisory board mandates exclusively to politicians. Thus, only two-thirds of the companies appoint external members. Importantly, this finding demonstrates that a significant number of companies do not comply with the recommendations of the German *Public Corporate Governance Kodex*,
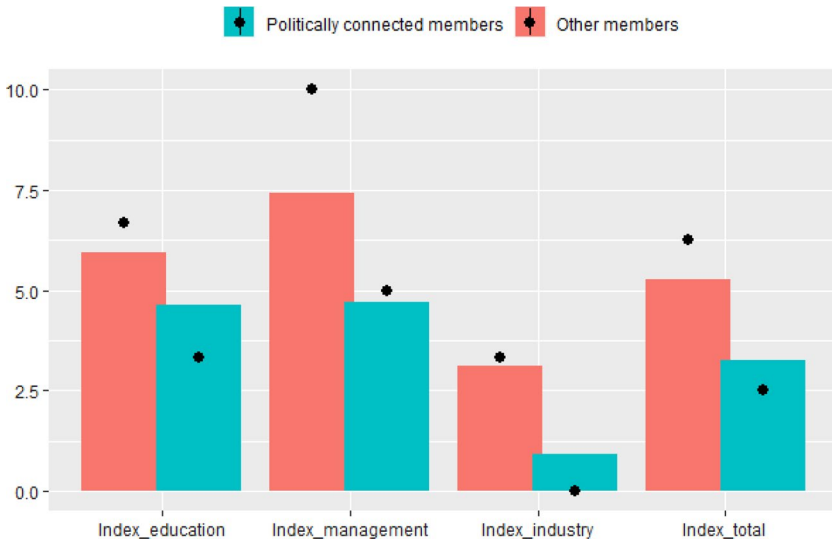
Fig. 2 Supervisory board competence. Note: The figure shows the means and median values (●) for the competence indices of all owner representatives, grouped according to their political background. To achieve better comparability, each index is scaled so that the values can vary from 0 to 10

which explicitly calls for the participation of external and independent members who are qualified and experienced in the industry.

Table 1 also shows statistically significant differences in competence between politically connected and non-political members. The differences are particularly significant with regard to management and industry experience. Across both groups, the average industry experience *index_industry* has the lowest values. Overall, only one in three board members has experience in the energy sector.[13] At the same time, the index also shows the largest differences between political and non-political members. While 64% of non-political members have industry experience, only 21.2% of political members do. The non-political group has an index value almost three-and-a-half times higher than the index value of politically connected members.

In terms of management experience, the largest difference lies in top management expertise (*Index_2b*)—64% of non-political members have worked at higher management levels, compared to only 33.4% of politically connected members. In summary, the group of "other members" has a 60% higher index score in management experience. The difference is slightest in the education category, but politically connected members exhibit a lower index score. The two groups differ notably in their choice of education subject (*Index_1c*). Around 41% of the politically connected members have a degree in business or technology compared to 64% of other board members. Considering all eight categories, our data shows an overall mean of 2.6 index points for politically connected members and 4.22 for non-political members.

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[13] Experience in the energy sector means that the variable index_industry is greater than 0.

Table 2 Summary statistics

	N	Mean	Median	Min	P25	P75	Max	St. Dev
Board variables								
$\ln(1+\text{Index\_total})$	348	1.36	1.35	0.73	1.20	1.53	1.89	0.23
$\ln(1+\text{Index\_edu})$	348	0.90	0.92	0.56	0.82	0.98	1.23	0.13
$\ln(1+\text{Index\_man})$	348	0.71	0.75	0.15	0.55	0.88	1.10	0.22
$\ln(1+\text{Index\_ind})$	348	0.33	0.30	0.00	0.13	0.49	0.99	0.26
$\ln(1+\text{share\_MWIE})$	348	0.30	0.29	0.00	0.18	0.41	0.64	0.16
Dummy_pol	348	0.33	0	0	0	1	1	0.47
Firm variables								
share_priv	348	0.09	0	0	0	0.2	0.5	0.16
numb_publ	348	1.52	1	1	1	2	6	0.92
main_owner	348	0.83	1	0	1	1	1	0.38
publ_serv	348	0.59	1	0	0	1	1	0.49
Operating performance measures								
ROA	340	3.15	2.70	− 6.30	1.29	5.07	16.61	3.35
ROE	340	7.69	6.79	− 20.80	3.41	12.33	36.32	8.46
Profit per employee	337	28.12	16.21	− 58.95	6.72	40.02	385.62	40.45

The board variables include the four logarithmic indices, the share of managers without industry experience, and the participation of supervisory board members without a political background. The firm variables include the share of private owners, the number of public owners, and a dummy variable that tests whether a public agency owns more than 50% of the shares. In addition, controls determine whether the company provides public services such as local public transport or public recreation facilities. The operating performance of the companies is measured by ROA, ROE, and profit per employee

Figure 2 illustrates the mean and median values of both groups for all four competence indices. For better comparability, each index is scaled so that values can range from 0 to 10. The graph shows that the differences between the groups are even more significant when medians are considered instead of averages.

To analyze the impact on company performance, the index data must be aggregated at the company level. In the end, a total of 348 aggregated company-year index values could be included in the econometric analysis. Table 2 presents the summary statistics of the variables used for the regression.

Table 3 shows the corresponding correlation of the variables whereby there should be no problems with multicollinearity. This result could also be confirmed for the following models using variance inflation factors.

4 Estimation results

4.1 Hypotheses results

Regression results are shown in Table 4. The model specifications analyze the influence of board competence on firm performance using the four aggregate indices, i.e., the educational index, the average management experience index, the average

Table 3 Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13
ln(1 + Index_total)	1												
ln(1 + Index_edu)	0.78	1											
ln(1 + Index_man)	0.83	0.50	1										
ln(1 + Index_ind)	0.75	0.41	0.38	1									
ln(1 + share_MWIE)	− 0.11	− 0.07	0.31	− 0.59	1								
Dummy_pol	− 0.43	− 0.31	− 0.42	− 0.26	− 0.04	1							
share_priv	0.41	0.43	0.21	0.39	− 0.24	− 0.32	1						
numb_publ	0.17	0.13	0.23	0.02	0.16	− 0.14	0.33	1					
main_owner	− 0.37	− 0.28	− 0.26	− 0.34	0.15	0.26	− 0.50	− 0.49	1				
publ_serv	− 0.47	− 0.41	− 0.29	− 0.45	0.19	0.37	− 0.68	− 0.33	0.55	1			
ROA	0.21	0.18	0.06	0.33	− 0.35	− 0.22	0.43	0.20	− 0.39	− 0.57	1		
ROE	0.22	0.24	0.07	0.28	− 0.29	− 0.22	0.48	0.14	− 0.34	− 0.57	0.93	1	
Profit per employee	0.20	0.20	0.02	0.32	− 0.26	− 0.19	0.35	0.11	− 0.34	− 0.56	0.81	0.76	1

The table shows the Pearson correlation coefficients for the variables of interest at the firm level

Table 4 Impact of supervisory board competence on firm performance

	Dependent variable														
	ROA					ROE					Profit per employee				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
ln(1+Index_total)	−0.833					−2.905					−5.460				
	(1.749)					(4.160)					(16.600)				
ln(1+Index_edu)		−1.662			−1.203		−0.824			1.952		0.733			12.351
		(2.685)			(2.524)		(6.286)			(5.944)		(26.997)			(26.942)
ln(1+Index_man)			−1.567		−1.933			−4.058		−5.037			−20.270		−30.249**
			(1.663)		(1.683)			(4.314)		(4.604)			(14.568)		(14.946)
ln(1+Index_ind)				1.133	1.789				0.230	1.313				12.617	18.841
				(1.238)	(1.300)				(3.055)	(3.369)				(12.975)	(12.323)
Dummy_Pol	−0.301	−0.268	−0.428	−0.149	−0.454	−0.425	−0.104	−0.665	−0.060	−0.669	−1.725	−1.023	−4.066	−0.486	−4.197
	(0.485)	(0.522)	(0.478)	(0.519)	(0.485)	(1.379)	(1.489)	(1.362)	(1.492)	(1.366)	(5.308)	(5.048)	(5.338)	(5.241)	(5.412)
share_priv	1.722	1.936	1.396	1.390	1.224	9.854	9.637	8.914	9.432	8.141	−3.430	−4.333	−6.881	−6.886	−14.646
	(3.554)	(3.403)	(3.673)	(3.345)	(3.231)	(7.905)	(7.538)	(8.142)	(7.475)	(7.411)	(46.154)	(44.789)	(47.650)	(44.502)	(42.953)
numb_publ	−0.091	−0.093	−0.038	−0.008	0.078	−0.736	−0.708	−0.591	−0.687	−0.466	−4.238	−4.165	−3.625	−3.353	−2.045
	(0.496)	(0.494)	(0.523)	(0.469)	(0.479)	(1.135)	(1.125)	(1.192)	(1.067)	(1.089)	(5.435)	(5.387)	(5.744)	(4.952)	(4.960)
main_owner	−1.194	−1.139	−1.186	−0.957	−0.949	−1.177	−0.939	−1.093	−0.897	−0.919	−13.121	−12.681	−13.377	−10.912	−10.951
	(1.418)	(1.421)	(1.439)	(1.333)	(1.355)	(3.083)	(3.035)	(3.149)	(2.932)	(2.983)	(17.385)	(17.808)	(17.864)	(16.753)	(16.733)
publ_serv	−3.140***	−3.128***	−3.155***	−2.884***	−2.976***	−8.047***	−7.770***	−8.005***	−7.697***	−7.786***	−45.436***	−44.786***	−46.266***	−42.942***	−43.567***
	(0.949)	(0.925)	(0.899)	(0.917)	(0.947)	(2.555)	(2.464)	(2.407)	(2.539)	(2.536)	(12.475)	(12.208)	(11.773)	(12.366)	(12.204)
Ln_sales	−0.541**	−0.550**	−0.500*	−0.578**	−0.484*	−0.431	−0.520	−0.350	−0.531	−0.340	−8.504***	−8.695***	−7.804***	−8.775***	−7.648***
	(0.257)	(0.240)	(0.262)	(0.231)	(0.252)	(0.676)	(0.630)	(0.688)	(0.624)	(0.674)	(2.434)	(2.351)	(2.374)	(2.307)	(2.305)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	340	340	340	340	340	340	340	340	340	340	337	337	337	337	337
R^2	0.374	0.375	0.380	0.378	0.392	0.359	0.355	0.363	0.355	0.365	0.381	0.380	0.388	0.385	0.400

Table 4 (continued)

	Dependent variable														
	ROA					ROE					Profit per employee				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Adjusted R^2	0.351	0.352	0.357	0.355	0.366	0.336	0.332	0.340	0.332	0.338	0.358	0.357	0.366	0.362	0.374
F Statistic	16.294*** (df=12; 327)	16.363*** (df=12; 327)	16.671*** (df=12; 327)	16.534*** (df=12; 327)	14.996*** (df=14; 325)	15.286*** (df=12; 327)	15.021*** (df=12; 327)	15.539*** (df=12; 327)	15.016*** (df=12; 327)	13.343*** (df=14; 325)	16.595*** (df=12; 324)	16.551*** (df=12; 324)	17.153*** (df=12; 324)	16.880*** (df=12; 324)	15.312*** (df=14; 322)

This table presents OLS regression coefficient estimates with time fixed effects for all three operating performance measures. Arellano (1987) cluster standard errors—robust to heteroskedasticity and serial correlation—are reported in parentheses, and significance at the 1, 5, and 10% levels is indicated by ***, **, and *, respectively.

industry experience index, and the aggregated index of total competence. Additional control variables were included to consider the ownership structure and company activities. The results present OLS coefficient estimates with time fixed effects for all three operating performance measures. For ROA as the dependent variable, Columns (1)–(4) show the regression results for each of the indices, and column (5) includes all three sub-indices simultaneously. The same applies to columns (6)–(10) for the dependent variable ROE and (11)–(15) for profit per employee.

The estimations indicate insignificant results for all index variables except for *management experience* in column (15) which is statistically significant at the 5% level. Accordingly, for 14 out of 15 model specifications the results do not show any significance for the performance measures ROA, ROE, and profit per employee. Thus, there is no empirical support for Hypotheses *H1*, *H2* and *H3*. However, the index variable *industry experience* consistently shows a pattern of positive coefficients indicating some agreement with hypothesis *H2*, though at an insignificant level. All other index variables either show either negative or alternating values so that no pattern that is supportive of the hypotheses can be identified.

Appointing politicians to the supervisory boards of state-owned enterprises does not seem to play a role in company performance—the variable *Dummy_pol* shows consistently negative values but statistically insignificant in all specifications.[14] The only control variable with robustly significant effects is *publ_serv*. The provision of public transport and public recreation facilities has a clear negative effect on company performance. However, this result is not surprising, as these business areas are often not cost-covering.

Comparing our findings with the results of the studies by Hau and Thum (2009) and Jin and Mamatzakis (2018), we can conclude that both studies do not find education or management experience to have a statistically significant influence which is consistent to our findings. Additionally, Hau and Thum (2009) and Jin and Mamatzakis (2018) argue that financial experience has a relevant positive impact in the banking sector, while the coefficients of the *industry experience* variable in our analysis point the same direction but remain statistically insignificant.[15] Overall, none of the three hypotheses *H1*, *H2* and *H3* can ultimately be confirmed.

4.2 Further regression results

Based on these ambiguous results, the question arises whether there may be further effects that need to be considered. We thus analyzed whether there is a difference if a supervisory board member holds prior management experience from the same or a different industry than that to which the supervised company belongs.

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[14] Instead of modeling politicization as a dummy, the share of politicians on the overall supervisory board was also used as a robustness check. Results are available upon request.

[15] Significant results for this dimension could only be found using OLS (with a p-value of less than 0.05) when we chose profit in absolute terms as the dependent variable and controlled for the size of the company instead. Since absolute dependents are less useful, we have not included this model in the main analysis. The corresponding results are available upon request.

This rationale is based on the assumption that supervisory board members with prior management experience from different industries might rely too heavily on knowledge that cannot be transferred to the industry-specific mechanisms of the supervised company, which might ultimately cause them to do more harm than good.

To verify this conjecture, the variable *share_MWIE* was included in the next step. Since interaction effects took place at the individual level, but the regression was run at the company level, we could not model the interaction effect by simply multiplying the two variables. Instead, the variable *share_MWIE* was created to represent the proportion of members on the supervisory board who have management experience and, at the same time, no prior knowledge of the industry ("**m**anager **w**ithout **i**ndustry **e**xperience").

Table 5 presents the results. The variable *share_MWIE* shows statistically significant results at the 1% level for specifications estimating ROA (columns (1)) and ROE (column (3)). Even when firm fixed effects are taken into account (columns (2) and (4)) the effects remain significant at the 1% level and the 5% level, respectively. For profit per employee (columns (5) and (6)), the variable is insignificant. These results are of high interest as they could explain the sensitive results in Table 4. Moreover, they seem to support the assumption that "wrong" management experience harms the supervised companies.

The estimations in Table 5 neglect the original four measures of supervisory board competence. Thus Table 6 reports the effect of looking at the index variables simultaneously. Columns (1)–(4) show the regressions for the overall index and each of the individual sub-indices for the dependent variable ROA, while column (5) includes all three sub-indices simultaneously. The same applies to columns (6)–(10) for the dependent variable ROE and (11)–(15) for profit per employee.

As before, the four original measures on general competence (*index_total*), education (*index_edu*), management experience (*index_man*) and industry experience (*index_ind*) do not show a statistically significant influence. The newly added variable on *manager without industry experience (MWIE)* shows significant results for the profit ratios ROA and ROE but not for profit per employee. These results confirm our assumption that managers without sufficient knowledge of the energy sector are the relevant factor that causes the negative impact on company performance—at least for the two relative performance measures.

So far, the results of the control variable *Dummy_Pol* suggest that politically connected board members have no measurable influence on company performance. To further validate this result, we repeated the previous estimations based on two sub-samples consisting of only politically connected and non-political supervisory board members. The indices indicating board competences were calculated separately for both sub-samples. As shown in Table 7, the results confirm the assumption that politically connected board members have no particular influence on company performance compared to their non-political peers.

Columns (1) to (3) show the results for a sub-sample containing only supervisory board members with a political background. Columns (4) to (6) show the results when only non-politicians are considered. No statistically significant effects can be found for both sub-samples (except for the *MWIE* variable in column (4) which

Table 5 Impact on firm performance of managers without industry experience

	Dependent variable					
	ROA		ROE		Profit per employee	
	(1)	(2)	(3)	(4)	(5)	(6)
ln (1 + share_MWIE)	− 4.630***	− 4.752***	− 8.727***	− 9.912**	− 21.211	− 21.693
	(1.042)	(1.604)	(2.706)	(4.257)	(12.974)	(24.467)
Dummy_Pol	− 0.369	− 0.686*	− 0.391	− 1.533	− 1.818	− 13.514**
	(0.332)	(0.395)	(0.863)	(1.047)	(4.141)	(6.003)
share_priv	0.310		7.020**		− 10.058	
	(1.255)		(3.258)		(15.705)	
numb_publ	0.177		− 0.216		− 2.998	
	(0.188)		(0.487)		(2.337)	
main_owner	− 0.735		− 0.199		− 10.946*	
	(0.506)		(1.315)		(6.322)	
publ_serv	− 2.993***		− 7.625***		− 44.519***	
	(0.429)		(1.115)		(5.387)	
Ln_sales	− 0.380***	0.470	− 0.172	2.030	− 7.819***	− 17.232
	(0.134)	(0.898)	(0.347)	(2.385)	(1.664)	(13.972)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	340	340	340	340	337	337
R^2	0.408	0.054	0.375	0.038	0.385	0.031
Adjusted R^2	0.386	− 0.170	0.352	− 0.190	0.362	− 0.202
F Statistic	18.763*** (df = 12; 327)	5.231*** (df = 3; 274)	16.358*** (df = 12; 327)	3.595** (df = 3; 274)	16.910*** (df = 12; 324)	2.843** (df = 3; 271)

This table presents OLS regression coefficient estimates with time fixed effects in columns (1), (3), and (5) for log(1 + share_MWIE). The variable measures the share of managers without industry experience who serve on the supervisory board. Columns (2), (4), and (6) present "within" models with time and firm fixed effects. Again, Arellano (1987) cluster standard errors—robust to heteroskedasticity and serial correlation—are reported in parentheses, and significance at the 1, 5, and 10% levels is indicated by ***, **, and *, respectively

Table 6 Impact of supervisory board competence and managers without industry experience on firm performance

Dependent variable	ROA					ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(1+Index_total)	− 1.197					− 3.605		
	(1.602)					(3.993)		
ln(1+Index_edu)		− 1.701			− 1.575		− 0.897	
		(2.407)			(2.387)		(5.821)	
ln(1+Index_man)			− 0.591		0.466			− 2.330
			(1.639)		(1.928)			(4.166)
ln(1+Index_ind)				− 0.949	− 0.953			
				(1.658)	(1.906)			
ln(1+share_MWIE)	− 4.800***	− 4.640**	− 4.388**	− 5.560**	− 5.764**	− 9.238**	− 8.732*	− 7.772*
	(1.818)	(1.798)	(1.848)	(2.493)	(2.854)	(4.572)	(4.537)	(4.243)
Dummy_pol	− 0.521	− 0.440	− 0.447	− 0.445	− 0.450	− 0.850	− 0.428	− 0.697
	(0.478)	(0.503)	(0.480)	(0.475)	(0.484)	(1.313)	(1.404)	(1.332)
share_priv	0.417	0.636	0.296	0.236	0.548	7.342	7.192	6.965
	(3.340)	(3.154)	(3.330)	(3.379)	(3.206)	(7.658)	(7.214)	(7.619)
numb_publ	0.172	0.165	0.180	0.168	0.155	− 0.230	− 0.223	− 0.206
	(0.489)	(0.478)	(0.492)	(0.483)	(0.476)	(1.131)	(1.105)	(1.139)
main_owner	− 0.822	− 0.751	− 0.779	− 0.797	− 0.777	− 0.462	− 0.207	− 0.372
	(1.305)	(1.300)	(1.299)	(1.299)	(1.308)	(2.934)	(2.877)	(2.941)
publ_serv	− 3.121***	− 3.074***	− 3.036***	− 3.120***	− 3.162***	− 8.012***	− 7.668***	− 7.794***

Table 6 (continued)

	Dependent variable							
	ROA					ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(0.892)	(0.868)	(0.855)	(0.910)	(0.934)	(2.436)	(2.356)	(2.346)
Ln_sales	− 0.332	− 0.360	− 0.364	− 0.335	− 0.328	− 0.029	− 0.162	− 0.108
	(0.263)	(0.246)	(0.256)	(0.276)	(0.276)	(0.698)	(0.652)	(0.679)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	340	340	340	340	340	340	340	340
R^2	0.412	0.411	0.409	0.410	0.413	0.381	0.375	0.377
Adjusted R^2	0.389	0.388	0.385	0.387	0.385	0.357	0.350	0.353
F statistic	17.585*** (df = 13; 326)	17.504*** (df = 13; 326)	17.336*** (df = 13; 326)	17.445*** (df = 13; 326)	15.170*** (df = 15; 324)	15.461*** (df = 13; 326)	15.063*** (df = 13; 326)	15.206*** (df = 13; 326)

	Dependent variable						
	ROE		Profit per employee				
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
ln(1 + Index_total)			− 7.138 (15.917)				
ln(1 + Index_edu)		0.998 (5.685)		0.540 (26.095)			14.228 (27.749)
ln(1 + Index_man)		1.114 (5.191)			− 17.058 (17.039)		− 41.797* (22.707)
ln(1 + Index_ind)	− 4.797 (4.400)	− 5.720 (5.332)				7.285 (15.490)	32.042* (19.301)

is slightly significant at the 10% level) indicating that there are the no differences between the two sub-samples. Interestingly, the negative influence of *managers without industry experience* found for the entire sample as shown in Table 6 cannot be found in the separate subsamples.

4.3 Endogeneity

Even though managers without industry experience seem to play a relevant role in this data, the results should be considered somewhat exploratory. Like most studies in corporate governance, this study design cannot adequately address endogeneities, and coefficients might be biased as a result. Endogeneity problems occur when the independent variable correlates with the error term. This result can have various causes, e.g., omitted variables, misspecification of the regression function, imprecise measurement of the independent variables, or reversed causality (Roberts & Whited, 2013).

One robustness check is given in Table 8. The estimations control for possible endogeneities by modeling time lags to address problems of reversed causality. For this, we integrated each respective dependent variable from the previous period as an additional independent variable. As before, the various competence indices do not show any statistical significant influence on the three performance indicators. Next, in columns (1)–(5), the variable *share_MWIE* and *ROA* again shows statistical significance at the 1% level and the 5% level. For the performance measurement *ROE* in columns (6) to (10), we also find statistically significant results in all specification at various significance levels. Results for the dependent variable *profit per employee* still remain insignificant as seen in above. Thus, when time lags are modeled, the results show comparable effects to the original model in Table 6. Results even seem to gain some statistical significance.

Nonetheless, we cannot entirely rule out the possibility of endogeneity problems due to reversed causality. Accordingly, managers without industry experience would not necessarily harm firm performance. Instead, poor firm performance might lead to the engagement of more supervisors with management experience. However, causes other than endogeneity problems could also explain the results, so this interpretation should also be treated with caution. Especially in election years when, for example, many supervisory board mandates are newly allocated, a model with a time lag loses its informative value.

Endogeneities based on missing variables also seem to be particularly important such that unobserved firm-specific characteristics might simultaneously affect the choice of the supervisory board members and firm performance. Fixed effects at the company level, as in Table 5, can be used to control for firm-specific characteristics. However, there is also a problem in the interpretation, as fixed effects consider the variation within a firm und thus eliminate level differences between the companies. But exactly these differences seem to be relevant in our case and reduce the explanatory power of the analysis.

Table 6 (continued)

	Dependent variable						
	ROE		Profit per employee				
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
ln(1 + share_MWIE)	− 13.427**	− 14.783**	− 22.211	− 21.207	− 14.140	− 14.066	27.627
	(6.465)	(7.369)	(18.997)	(19.519)	(22.861)	(23.161)	(33.750)
Dummy_pol	− 0.775	− 0.660	− 2.732	− 1.796	− 4.099	− 1.233	− 4.248
	(1.325)	(1.330)	(4.952)	(4.749)	(5.373)	(4.658)	(5.451)
share_priv	6.644	6.407	− 9.342	− 10.163	− 10.367	− 9.639	− 11.723
	(7.863)	(7.540)	(43.667)	(42.127)	(44.335)	(43.534)	(41.244)
numb_publ	− 0.261	− 0.268	− 3.031	− 2.994	− 2.929	− 2.921	− 2.393
	(1.124)	(1.105)	(5.053)	(4.937)	(5.149)	(4.929)	(4.854)
main_owner	− 0.511	− 0.479	− 11.430	− 10.942	− 12.106	− 10.507	− 11.737
	(2.945)	(2.974)	(16.631)	(16.927)	(16.726)	(16.620)	(16.545)
publ_serv	− 8.268***	− 8.263***	− 45.307***	− 44.492***	− 45.835***	− 43.535***	− 42.726***
	(2.500)	(2.523)	(12.515)	(12.311)	(12.210)	(12.241)	(11.654)
Ln_sales	0.057	0.059	− 7.539***	− 7.825***	− 7.366***	− 8.162***	− 8.390***
	(0.723)	(0.722)	(2.562)	(2.517)	(2.398)	(2.724)	(2.500)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	340	340	337	337	337	337	337
R^2	0.385	0.386	0.386	0.385	0.391	0.386	0.403
Adjusted R^2	0.361	0.357	0.361	0.360	0.366	0.361	0.375
F statistic	15.703*** (df = 13; 326)	13.561*** (df = 15; 324)	15.631*** (df = 13; 323)	15.562*** (df = 13; 323)	15.921*** (df = 13; 323)	15.626*** (df = 13; 323)	14.430*** (df = 15; 321)

This table presents OLS regression coefficient estimates with time fixed effects. Again, Arellano (1987) cluster standard errors—robust to heteroskedasticity and serial correlation—are reported in parentheses, and significance at the 1, 5, and 10% levels is indicated by ***, **, and *, respectively

Another source of error could be measurement errors. In the context of data collection, only publically available information can be taken into account. For example, people are assumed to lack industry experience if their life path is insufficiently traceable and their current position does not indicate experience in the energy sector. This lack of data can easily lead to misjudgments due to incomplete information.

A common way to address the endogeneity problem is to use a two-stage regression with instrument variables. Unfortunately, finding valid instruments is highly problematic. For example, Hau and Thum (2009) use this method with the percentage of political representatives and a dummy variable for state ownership as instruments. However, the low F-statistics indicate weak instruments, and these results are also likely to be biased. Moreover, the use of weak instruments can do more harm than good. Hahn and Hausman (2003) demonstrate that two-stage least squares (2SLS) analysis with weak instruments may bias the results more than the initial OLS estimate.

For the reasons mentioned above, endogeneity problems cannot be eliminated, and the reported results must be interpreted with caution.[16]

4.4 Discussion

Despite the lower levels of business competence among politically connected board members in terms of education, management experience, and industry experience, the estimation results indicate no relevant influence of these factors on the financial performance of the analyzed utility companies. All of the proposed hypotheses were thus rejected. While we cannot confirm findings in the literature that positively connect board member education to firm performance (Fernandes et al., 2016; Jalbert et al., 2002; Pereira & Filipe, 2018), our results confirm the results by Hau and Thum (2009) and Jin and Mamatzakis (2018) that board members' education does not influence company performance. Regarding management experience, our insignificant results are somewhat consistent with the empirical evidence as the relevant literature finds ambiguous (Volonté & Gantenbein, 2016) or no (Hau & Thum, 2009) effects.

We also cannot confirm the impact of industry experience on company performance since this measure also remains inconspicuous in our study. This finding contrasts with empirical evidence in the literature, which generally points to a positive relationship (Custódio & Metzger, 2013; Güner et al., 2008; Hau & Thum, 2009; Jin & Mamatzakis, 2018; Meyerinck et al., 2016).

One possible interpretation of this result may be found in the unique institutional setting of state-owned enterprises. Since SOEs are greatly influenced by the political sphere, stakeholder interests are more fragmented and complex when compared to privately-owned companies. It is possible that the influence of supervisory boards

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[16] We additionally tested a "One Step System GMM" and treated all index variables as endogenous. The results remain comparable. We also tested our specifications by applying random effects and OLS with panel corrected standard errors. In both cases results are very close compared to our estimations. The PCSE estimator even shows higher significance of the main variable of interest. All additional results are available upon request.

Table 7 Impact of politicians

	Dependent variable					
	Politicians			Other members		
	ROA	ROE	Profit per employee	ROA	ROE	Profit per employee
	(1)	(2)	(3)	(4)	(5)	(6)
ln(1 + Index_total)	− 1.306	− 3.606	− 9.086	− 0.327	− 1.050	6.612
	(1.456)	(3.818)	(11.527)	(0.988)	(2.462)	(7.553)
ln(1 + share_MWIE)	− 1.792	− 2.499	− 12.077	− 1.878*	− 4.005	− 13.459
	(1.108)	(3.119)	(10.609)	(1.072)	(2.516)	(11.504)
share_priv	− 2.141	1.827	− 51.652*	1.392	10.716	14.559
	(2.322)	(6.418)	(30.706)	(3.825)	(8.217)	(53.533)
numb_publ	0.459	0.431	2.552	0.034	− 0.455	− 5.364
	(0.342)	(0.994)	(3.132)	(0.519)	(1.152)	(5.857)
main_owner	0.090	1.704	4.216	− 0.999	− 1.045	− 17.823
	(0.975)	(2.485)	(12.477)	(1.482)	(3.210)	(18.843)
publ_serv	− 3.756***	− 9.066***	− 53.426***	− 3.254***	− 7.009**	− 33.495*
	(0.730)	(2.028)	(9.597)	(1.182)	(2.822)	(17.966)
Ln_sales	− 0.400	− 0.222	− 7.232***	− 0.777***	− 0.823	− 8.687*
	(0.264)	(0.711)	(2.405)	(0.362)	(0.794)	(4.564)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	334	334	331	205	205	202
R^2	0.391	0.343	0.411	0.442	0.423	0.431
Adjusted R^2	0.368	0.318	0.389	0.407	0.387	0.395
F statistic	17.140*** (df = 12; 321)	13.946*** (df = 12; 321)	18.521*** (df = 12; 318)	12.667*** (df = 12; 192)	11.753*** (df = 12; 192)	11.919*** (df = 12; 189)

The results from Table 6 were repeated here for two sub-samples. Columns (1)–(3) contain only the data of supervisory board members with a political background. Columns (4)–(6) contain only data from non-politicians. The results for Index_total are shown here as an example. The other indices show the same results. Again, Arellano (1987) cluster standard errors—robust to heteroskedasticity and serial correlation—are reported in parentheses, and significance at the 1, 5, and 10% levels is indicated by ***, **, and *, respectively.

Table 8 Robustness checks

	Dependent variable							
	ROA					ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged Dep. Var	0.503***	0.503***	0.505***	0.506***	0.504***	0.455***	0.460***	0.458***
	(0.071)	(0.072)	(0.071)	(0.070)	(0.072)	(0.090)	(0.092)	(0.092)
ln(1 + Index_total)	− 1.066					− 3.282		
	(0.949)					(2.519)		
ln(1 + Index_edu)		− 1.220			− 1.020		− 1.445	
		(1.439)			(1.406)		(3.786)	
ln(1 + Index_man)			− 0.551		0.657			− 1.899
			(0.974)		(1.199)			(2.648)
ln(1 + Index_ind)				− 1.187	− 1.428			
				(1.031)	(1.259)			
ln (1 + share_MWIE)	− 3.011***	− 2.873**	− 2.622**	− 4.016**	− 4.544**	− 6.594**	− 6.127**	− 5.324*
	(1.159)	(1.146)	(1.159)	(1.565)	(1.867)	(3.066)	(3.025)	(2.838)
Dummy_pol	− 0.544	− 0.458	− 0.478	− 0.502	− 0.479	− 1.003	− 0.640	− 0.829
	(0.330)	(0.328)	(0.331)	(0.314)	(0.333)	(0.911)	(0.927)	(0.929)
share_priv	− 0.354	− 0.225	− 0.462	− 0.553	− 0.373	2.633	2.557	2.287
	(1.937)	(1.820)	(1.932)	(1.959)	(1.838)	(4.657)	(4.408)	(4.660)
numb_publ	0.049	0.046	0.057	0.042	0.030	− 0.234	− 0.223	− 0.208
	(0.328)	(0.321)	(0.329)	(0.322)	(0.315)	(0.797)	(0.780)	(0.804)
main_owner	− 0.708	− 0.644	− 0.670	− 0.708	− 0.688	− 0.853	− 0.634	− 0.753

Table 8 (continued)

Dependent variable

	ROA					ROE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(0.795)	(0.795)	(0.795)	(0.791)	(0.790)	(1.887)	(1.872)	(1.896)
publ_serv	− 1.830***	− 1.771***	− 1.746***	− 1.870***	− 1.910***	− 5.139***	− 4.817***	− 4.900***
	(0.552)	(0.548)	(0.521)	(0.557)	(0.584)	(1.662)	(1.625)	(1.598)
Ln_sales	− 0.159	− 0.187	− 0.185	− 0.144	− 0.139	0.120	0.009	0.043
	(0.141)	(0.135)	(0.140)	(0.147)	(0.149)	(0.388)	(0.367)	(0.382)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	333	333	333	333	333	333	333	333
R^2	0.597	0.596	0.595	0.598	0.599	0.546	0.541	0.542
Adjusted R^2	0.580	0.578	0.577	0.580	0.579	0.526	0.521	0.522
F statistic	33.705*** (df = 14; 318)	33.455*** (df = 14; 318)	33.337*** (df = 14; 318)	33.759*** (df = 14; 318)	29.500*** (df = 16; 316)	27.268*** (df = 14; 318)	26.746*** (df = 14; 318)	26.875*** (df = 14; 318)

Dependent variable

	ROE		Profit per employee				
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Lagged Dep. Var	0.455***	0.456***	0.121	0.121	0.119	0.120	0.111
	(0.089)	(0.090)	(0.272)	(0.273)	(0.268)	(0.273)	(0.260)
ln(1 + Index_total)			− 8.964				
			(14.235)				
ln(1 + Index_edu)		− 0.109		− 1.438			13.641

Table 8 (continued)

	Dependent variable						
	ROE		Profit per employee				
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
ln(1 + Index_man)		2.099 (3.783)		(24.525)	− 18.206 (15.804)		− 39.983 (26.752)
ln(1 + Index_ind)	− 4.767 (2.999)	− 6.124 (3.766)				3.573 (14.353)	27.565 (25.245)
ln (1 + share_MWIE)	− 10.816** (4.268)	− 13.029*** (5.006)	− 20.049 (20.397)	− 18.831 (20.781)	− 10.958 (23.790)	− 15.294 (24.804)	25.758 (21.715)
Dummy_pol	− 0.966 (0.893)	− 0.803 (0.926)	− 1.641 (3.755)	− 0.525 (3.690)	− 2.912 (3.961)	− 0.162 (3.653)	− 2.932 (4.045)
share_priv	1.941 (4.731)	1.857 (4.472)	− 22.669 (42.030)	− 23.389 (40.743)	− 23.614 (42.475)	− 23.464 (42.284)	− 24.626 (40.275)
numb_publ	− 0.266 (0.788)	− 0.286 (0.767)	− 2.060 (4.614)	− 2.005 (4.516)	− 1.985 (4.708)	− 1.954 (4.558)	− 1.555 (4.537)
main_owner	− 0.929 (1.876)	− 0.871 (1.884)	− 8.836 (15.517)	− 8.268 (15.873)	− 9.429 (15.585)	− 8.060 (15.673)	− 9.208 (15.685)
publ_serv	− 5.449*** (1.695)	− 5.485*** (1.721)	− 46.500** (18.977)	− 45.569** (18.862)	− 46.997** (18.911)	− 45.034** (18.333)	− 44.535*** (17.574)
Ln_sales	0.218 (0.397)	0.228 (0.400)	− 6.098*** (2.428)	− 6.428*** (2.432)	− 5.987*** (2.241)	− 6.618** (2.706)	− 6.929*** (2.584)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 8 (continued)

	Dependent variable						
	ROE		Profit per employee				
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Observations	333	333	328	328	328	328	333
R²	0.550	0.551	0.437	0.435	0.441	0.435	0.597
Adjusted R²	0.530	0.528	0.411	0.410	0.416	0.410	0.580
F statistic	27.777*** (df=14; 318)	24.257*** (df=16; 316)	17.331*** (df=14; 313)	17.215*** (df=14; 313)	17.653*** (df=14; 313)	17.230*** (df=14; 313)	33.705*** (df=14; 318)

This table presents OLS regression coefficient estimates with time fixed effects. The dependent variables are lagged by one year. Again, Arellano (1987) cluster standard errors—robust to heteroskedasticity and serial correlation—are reported in parentheses, and significance at the 1, 5, and 10% levels is indicated by ***, **, and *, respectively

among SOEs is relatively weak, and decision-making power lies in bodies outside the typical construct of corporate governance. For example, Boll and Sidki (2021) argue that for German municipal SOEs, decisions of high impact and importance, such as investment decisions, are usually run through the municipal council as an external body rather than the supervisory board. As such, one interpretation of our results is that SOEs' supervisory boards might matter less in terms of the influence of their work on company financial performance.

One finding where board composition does matter is the significant negative effect on company performance measured by the relative profit ratios ROA and ROE of supervisory boards with a high proportion of managers without industry experience. While inexperienced mandate holders alone do not seem to play a decisive role, members of the supervisory board who have management experience from outside the energy sector have a significant negative impact. Thus, it is possible that managers without industry experience tend to overestimate their knowledge and competence, which is harmful to a certain extent as it is not directly transferable to the industry specifics of the supervised company. Supervisory board members with prior management experience but without deeper insights into industry specifics might succumb to erroneous self-assessments and, consequently, cause more harm than good in terms of the profitability of the supervised company. In fact, other studies demonstrate that leadership positions favor self-overestimating behavior. For example, Vitanova (2019, p. 1) concludes that "the amount of power allocated to the leader of an organization positively influences the probability that he/she will exhibit overconfident beliefs."

Individuals who exhibit overconfidence bias believe that they can make generalizations based on their personal experiences. They assume that they are better able to assess circumstances or forecast future developments than the average person and believe that they can do a better job than others (Moore & Healy, 2008). Studies show that this attitude plays a major role in economic decisions. For example, Camerer and Lovallo (1999) and Koellinger et al. (2015) find that overconfidence leads to increased business entry and business failures. Furthermore, the relevant literature agrees that managerial overconfidence matters for risky decisions in general—such as market entries, career choices, or financial investments (Adam et al., 2015; Bruhin et al., 2018).

Overconfidence could therefore impact corporate governance for managers without industry experience. A lack of knowledge of the sector could lead to misjudgments that are not recognized as such and result in bad decisions. Especially in the highly regulated and structurally complex energy market, industry experience is vital for self-confident managers if they cannot admit their lack of sector-related competencies.

5 Conclusion

This study investigated how the business competence of supervisory board members impacts the financial performance of state-owned utility companies. This question is particularly relevant for SOEs, as their supervisory board members are often politicians—as representatives of the public owner(s)—instead of external members. For

example, our data shows that 75% of the supervisory board members hold or have held a political mandate.

The competence of the board members was mapped via the three dimensions: education, management, and industry experience, and was ascertained by researching biographical information. We reveal that politically connected board members score worse in all three dimensions—especially in industry experience. However, regression analyses in this study do not show negative effects on the companies' profitability that can be attributed to a lack of competence which might be based upon supervisory boards' less decisive power due to the political connectedness of SOEs.

We explored the assumption that board members with previous management experience from other industries rely too much on knowledge that is not transferable to the industry-specifics of the energy sector. Indeed, the data shows that a higher proportion of managers without industry experience has a significant negative effect on two of the three analyzed profitability indicators (return-on-assets and return-on-equity), which might be based on the existence of a harmful overconfidence bias.

Our definition of competence is based on a formalized form in terms of business competence. However, SOEs do not necessarily pursue exclusively economic goals, but also public service goals. Moreover, they potentially have a wider range of primary stakeholders. Therefore, it seems feasible that other or additional forms of competencies are relevant for the achievement of these goals and that these competencies are primarily held by politicians and/or require political experience. In this respect, the focus on 'classic' board competencies, which are also applied in comparable studies focusing on the private sector, is a limitation of the study. A second limitation concerns the dependent variables under investigation. As described above, SOEs do not necessarily pursue only economic objectives. Depending on the company and, if applicable, the sector to which it belongs, public service objectives can also form a significant part of the company's orientation. Accordingly, an investigation of the effects of board competence on only financial or economic indicators such as ROA, ROE or profit per employee is limited in its conclusions.

In summary, this study contributes to filling the existing gap in the empirical literature on the specifics of corporate governance in state-owned enterprises. While most of the related research focuses on financial institutions, we examine the impact of board members' competencies and their divergent distribution between politically connected and non-political board members on corporate profitability. Thus, we extend the current understanding of competence and skills-based corporate governance research. Practitioners learn that the appointment of people with management experience from other sectors to the supervisory boards of SOEs should be viewed critically.

Apart from these initial statistical findings, no studies explicitly deal with the impact of board members who hold management experience from different than the analyzed industries. Consequently, our results provide a starting point for further research. For example, the question arises whether comparable results can also be found in state-owned enterprises in other sectors or even in the private sector. In other words, are our results a specific finding or do they represent a general pattern that is also present in different settings? Regarding the possible negative influence of overconfidence among managers without industry experience, future research could

clarify whether such problems also exist in other industries or in the private sector, or whether overconfidence bias differs when analyzing politically and non-politically connected board members. In connection with this, it should also be investigated in the future whether other theory-based explanations can be used in addition to the explanatory approach of overconfidence bias applied here.

Also, the integration of the public service character of SOEs both in the concept of board competence and in corresponding performance indicators appears to be a promising future approach. Thus, further approaches for future research activities arise not least from the limitations discussed above with regard to specifics of SOEs. For example, it could be investigated whether there are other types of competencies of supervisory board members beyond the business competences examined here that have an influence on the performance of SOEs. It could also be investigated whether there are other measures of performance than those analyzed here, which take into account the public mandate of SOEs in particular. This could include, for example, the degree of fulfilment of non-financial objectives (such as security of supply) or the adherence to objectives from the area of corporate social responsibility.

Data availability Data can be provided on request.

Code availability Code was written in R and can be provided on request.

Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose.

Ethical approval Research did not involve human participants and/or animals.

Consent to participate Research did not involve human participants and/or animals.

Consent for publication Research did not involve human participants and/or animals.

References

Adam, T., Fernando, C. S., & Golubeva, E. (2015). Managerial overconfidence and corporate risk management. *Journal of Banking & Finance, 60*, 195–208.

Alesina, A., & Tabellini, G. (1990). A positive theory of fiscal deficits and government debt. *The Review of Economic Studies, 57*(3), 403. https://doi.org/10.2307/2298021

Andres, P. D., Garcia-Rodriguez, I., Romero-Merino, M. E., & Santamaria-Mariscal, M. (2021). Politicians in disguise and financial experts on the board: Evidence from Spanish cajas. *Business Research Quarterly, 24*(2), 174–191.

Arellano, M. (1987). Computing robust standard errors for within-groups estimators. *Oxford Bulletin of Economics and Statistics, 49*(4), 431–434.

Bergh, A., Erlingsson, G., Gustafsson, A., & Wittberg, E. (2019). Municipally owned enterprises as danger zones for corruption? How politicians having feet in two camps may undermine conditions for accountability. *Public Integrity, 21*(3), 320–352.

Boll, D., Müller, H., & Sidki, M. (2020). Bilanzpolitik in kommunalen Unternehmen. *ZögU Zeitschrift Für Öffentliche Und Gemeinwirtschaftliche Unternehmen, 43*(4), 479–505.

Boll, D., & Sidki, M. (2021). The influence of political fragmentation on public enterprises: Evidence from German municipalities. *European Journal of Political Economy, 67*, 101972.

Bruhin, A., Santos-Pinto, L., & Staubli, D. (2018). How do beliefs about skill affect risky decisions? *Journal of Economic Behavior & Organization, 150*, 350–371.

Camerer, C., & Lovallo, D. (1999). Overconfidence and excess entry: An experimental approach. *The American Economic Review, 89*(1), 306–318.

Custódio, C., & Metzger, D. (2013). How do CEOs matter? The effect of industry expertise on acquisition returns. *The Review of Financial Studies, 26*(8), 2007–2047.

European Union. (2013). European system of accounts (ESA 2010)

Expertenkommission D-PCGM. (2020). Deutscher public corporate governance-musterkodex. www.pcg-musterkodex.de

Fernandes, C., Farinha, J., Martins, F. V., & Mateus, C. (2016). Supervisory boards, financial crisis and bank performance: Do board characteristics matter? *Journal of Banking Regulation, 18*(4), 310–337.

Fernandes, C., Farinha, J., Martins, F. V., & Mateus, C. (2018). Bank governance and performance: A survey of the literature. *Journal of Banking Regulation, 19*, 236–256. https://doi.org/10.1057/s41261-017-0045-0

Francis, B. B., Hasan, I., & Wu, Q. (2012). Do corporate boards matter during the current financial crisis? *Review of Financial Economics, 21*(2), 39–52.

Giovannini, E. (2013). SMEs: Credit risk modeling. In M. Anolli, E. Beccalli, & T. Giordani (Eds.), *Retail credit risk management* (pp. 77–90). Palgrave Macmillan UK. https://doi.org/10.1057/9781137006769_4

Güner, A. B., Malmendier, U., & Tate, G. (2008). Financial expertise of directors. *Journal of Financial Economics, 88*(2), 323–354.

Hahn, J., & Hausman, J. A. (2003). Weak instruments: Diagnosis and cures in empirical econometrics. *The American Economic Review, 93*(2), 118–125.

Hau, H., & Thum, M. (2009). *Subprime crisis and board (in-)competence: Private vs. public banks in Germany* (CESifo working papers No. 2640). Munich.

Helm, T., & Bischoff, C. (2020). Rücknahme der Vorlage zum EuGH: Ist der steuerliche Querverbund jetzt gesichert? *Zeitschrift Für Öffentliche Und Gemeinwirtschaftliche Unternehmen, 43*, 462–478.

Hopt, K. J. (2015). The German two-tier board (Aufsichtsrat): A German view on corporate governance. In K. J. Hopt & E. Wymeersch (Eds.), *Comparative corporate governance : Essays and materials* (pp. 3–20). de Gruyter.

Jalbert, T., Rao, R., & Jalbert, M. (2002). Does School Matter? An Empirical Analysis of CEO Education, Compensation, and Firm Performance. *International Business and Economics Research Journal*(1), 83–98.

Jin, C., & Mamatzakis, E. (2018). Board competence and bank performance in China. *Economics Bulletin, 38*(2), 681–688.

Johnson, S. G., Schnatterly, K., & Hill, A. D. (2013). Board composition beyond independence: Social capital, human capital, and demographics. *Journal of Management, 39*(1), 232–262.

Klimke-Stripf, B., & Morner, M. (2018). Parteiproporz statt Kompetenz? Eine Untersuchung zur Aufsichtsratsbesetzung in öffentlichen Unternehmen und den Einflussmöglichkeiten des städtischen Beteiligungsmanagements. *Verwaltung & Management, 24*(1), 17–26.

Koellinger, P., Minniti, M., & Schade, C. (2015). *"I think I can, I think I can": Overconfidence and entrepreneurial behavior* (DIW Discussion Papers). Berlin.

König, T., & Wruuck, P. (2011). Aufsichtsratskontrolle und strategische Agenda-Setzung in Landesbanken. *Perspektiven Der Wirtschaftspolitik : Eine Zeitschrift Des Vereins Für Socialpolitik : PWP, 12*(4), 397–412.

Menozzi, A., Gutiérrez Urtiaga, M., & Vannoni, D. (2012). Board composition, political connections, and performance in state-owned enterprises. *Industrial and Corporate Change, 21*(3), 671–698.

Meyerinck, F. V., Oesch, D., & Schmid, M. M. (2016). Is director industry experience valuable? *Financial Management, 45*(1), 207–237.

Moore, D. A., & Healy, P. J. (2008). The trouble with overconfidence. *Psychological Review, 115*(2), 502–517.

Mühlenkamp, H. (2006). Öffentliche Unternehmen aus der Sicht der neuen Institutionsökonomik. *ZögU - Zeitschrift Für Öffentliche Und Gemeinwirtschaftliche Unternehmen, 29*(4), 390–417. https://doi.org/10.5771/0344-9777-2006-4-390

Mühlenkamp, H. (2019). Effizienzkonzepte, Effizienzmessung und Effizienzvergleiche bei öffentlichen Unternehmen. In H. Mühlenkamp, F. Schulz-Nieswandt, M. Krajewski, & L. Theuvsen (Eds.), *Öffentliche Wirtschaft: Handbuch für Wissenschaft und Praxis* (1st ed., pp. 339–382). Nomos.

Papakonstantinou, F. (2008). *Boards of directors: The value of industry experience*. Mimeo.

Papenfuß, U. (2013a). *Aufsichtsräte öffentlicher Unternehmen: Vergleich zu Konzeption und Governance-Praxis*. Public Governance. https://publicgovernance.de/media/PG-Sommer_2013a.pdf

Papenfuß, U. (2013b). *Verantwortungsvolle Steuerung und Leitung öffentlicher Unternehmen. Research* [XXIII, 310 S].

Peni, E. (2014). Ceo and Chairperson characteristics and firm performance. *Journal of Management & Governance, 18*(1), 185–205.

Pereira, V., & Filipe, J. (2018). Quality of board members' training and bank financial performance: Evidence from Portugal. *International Journal of Economics and Business Administration, 6*(3), 47–79.

Proeller, I., & Krause, T. (2016). *Führungskräftebefragung bei öffentlichen Unternehmen: „Kommunale Beteiligungssteuerung“: Zusammenfassender Bericht*. Universität Potsdam.

Roberts, M. R., & Whited, T. M. (2013). Endogeneity in empirical coroporate finance. *Handbook of the economics of finance* (pp. 493–572). Elsevier.

Rogoff, K. (1990). Equilibrium political budget cycles. *The American Economic Review, 80*(1), 21–36.

Schmid, H. (2011). Wirtschaftliche Betätigung der Kommunen. *Zeitschrift Für Kommunalfinanzen, 51*(11), 242–248.

Shawtari, F. A. M., Mohamad, M. H. S., Rashid, H. M. A., & Ayedh, A. M. (2017). Board characteristics and real performance in Malaysian state-owned enterprises (SOEs). *The International Journal of Productivity and Performance Management, 66*(8), 1064–1086.

Sidki, M., & Boll, D. (2019). What do citizens think about public enterprises? Subjective survey data on the legitimacy of the economic activities of the German public sector. *Annals of Public and Cooperative Economics, 90*(4), 615–639.

Tremml, T., Löbbe, S., & Kuckertz, A. (2021). Board behavior's impact on entrepreneurial orientation in public enterprises. *Journal of Management and Governance.* Advance online publication. https://doi.org/10.1007/s10997-021-09592-8

Vitanova, I. (2019). Nurturing overconfidence: The relationship between leader power, overconfidence and firm performance. *The Leadership Quarterly.* Advance online publication. https://doi.org/10.1016/j.leaqua.2019.101342

Volonté, C., & Gantenbein, P. (2016). Directors' human capital, firm strategy, and firm performance. *Journal of Management & Governance, 20*(1), 115–145.

Voorn, B., van Genugten, M., & Sandra, T. (2020). Performance of municipally owned corporations: Determinants and mechanisms. *Annals of Public and Cooperative Economics, 91*, 191–212.

Wägner, N. (2017). *Statistics of annual accounts of public funds, institutions and enterprises: 2003–2012;*. Diw Data Documentation (DIW Data Documentation No. 87). Berlin. DIW. http://hdl.handle.net/10419/155360

Weiblein, W. (2011). Beteiligungscontrolling und -management. In B. Fabry & U. Augsten (Eds.), *Handbuch Unternehmen der öffentlichen Hand* (2nd ed., pp. 596–658). Nomos.

Marcus Sidki is professor of economics and head of the Research Center for Public and Nonprofit Enterprises at Ludwigshafen University of Applied Sciences and visiting professor at the University of Kaiserslautern-Landau in Germany. He holds a diploma in economics from University of Heidelberg and a PhD from the German University of Administrative Sciences Speyer. His research interests lie in the fields of public economics and sustainability economics.

Lara Boerger is a mediator and consultant for organizations, teams and individuals. Her expertise is the coaching of boards of directors and supervisory boards of energy cooperatives. She is a member of the Plural Economy Network and worked as a research assistant at the Research Center for Public and Nonprofit Enterprises at the Ludwigshafen University of Applied Sciences.

David Boll is data scientist at Deutsche Bahn. He completed his PhD at the Research Center for Public and Nonprofit Enterprises at Ludwigshafen University of Applied Sciences and the University of Kaiserslautern-Landau. His research interest is in the field of political economics with a focus on state-owned enterprises.