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## ORIGINAL ARTICLE

# Women directors, board attendance, and corporate financial performance

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## Abstract

**Research Question/Issue:** Using insights from an in-depth qualitative interview study, we propose an input-process-output model where the link between women directors (input) and corporate financial performance (output) is mediated by board attendance and where board attendance serves as a proxy of several intermediate but latent board processes. Further, we dig deeper into the nonlinearities of female boardroom representation by analyzing in how far the postulated mediation depends on the number of women in the boardroom.

**Research Findings/Insights:** Analyzing quantitative data from German supervisory boards over an 11-year period, we find the link between women directors and corporate financial performance to be partially mediated by board attendance, and we find the mediation to depend on whether there is more than just one “token” woman in the boardroom. When there is only one woman in the boardroom, her presence is positively linked to board attendance, but the higher board attendance does not translate into a better corporate financial performance.

**Theoretical/Academic Implications:** Our study contributes to theory, by inductively enriching our understanding of how and when women directors and corporate financial performance are linked.

**Practitioner/Policy Implications:** Our study encourages firms to appoint more than one woman to the boardroom to profit from an enhanced board attendance that will then also translate into a better corporate financial performance.

## KEYWORDS

board attendance, corporate governance, firm performance, tokenism, women directors

## 1 | INTRODUCTION

Women's representation on company boards has recently attracted much attention in academia and politics (see Dobija et al., 2021; González et al., 2020; Guldiken et al., 2019; Knippen et al., 2019; Kolev et al., 2021; Tyrowicz et al., 2020). Empirical evidence on the link between women directors and corporate financial performance, however, is inconclusive, and the mechanisms that drive the link are far

from being fully understood (see Cheng et al., 2021; Kirsch, 2018; Ting et al., 2021; Triana et al., 2014). Starting with Miller and Triana (2009) and inspired by the meta-analysis by Post and Byron (2015), the literature increasingly aims to explore the potential mediators (e.g., Bennouri et al., 2018; Galbreath, 2018; Van den Oever & Beerens, 2021; Veltrop et al., 2015) and boundary conditions (e.g., Cabeza-García et al., 2019; Terjesen et al., 2016) of the link between female boardroom representation and corporate financial performance.

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In our paper, we add to this literature and analyze board attendance as a potential mediator of the women–performance link. Specifically, we argue that board attendance is linked to several intermediate board processes that link board composition and board task performance, thus establishing a relation between female board representation, board attendance, and corporate financial performance. Further, we argue that there is an important boundary condition to the postulated mediation in that it will only hold when there is more than one woman in the boardroom. With our study, we thus follow Post's and Byron's (2015) call for more research on the potential boundary conditions of the link between women directors and corporate financial performance and at the same time complement the very few existing works that simultaneously investigate potential mediators and boundary conditions of the link between board gender diversity and corporate financial performance (see Ararat et al., 2015; Triana et al., 2019).

Our focus on board attendance as a mediator of the link between women directors and corporate financial performance is inspired by the works of Adams and Ferreira (2009), Bianco et al. (2015), and Boutchkova et al. (2021) who each find a positive link between women directors and board attendance. Our study departs from these existing works both, theoretically and empirically: theoretically, (a) by elaborating on the intermediate board processes that link women directors and corporate financial performance and by explicitly linking these intermediate board processes to board attendance; (b) by including a potential boundary condition of the postulated mediation in terms of whether there is only one or more than one woman in the boardroom; (c) by substantiating our conceptual model with the help of in-depth qualitative material from a self-conducted interview study with 17 board directors, and empirically; by (d) quantitatively analyzing the mediated link between women on boards, board attendance, and corporate financial performance and by quantitatively testing whether this mediation also holds in a situation where there is only one woman in the boardroom. While there is literature supporting the view that board attendance and corporate financial performance are positively linked (Brown & Caylor, 2006; Chou et al., 2013; Lin et al., 2014), a mediation model linking women on boards, board attendance, and corporate financial performance has not been tested before, nor have any boundary conditions been explored as yet.

In thus departing from the preceding literature, we aim to enhance our understanding of *why* and *when* board attendance might mediate the link between women directors and corporate financial performance. With respect to the former (the “why”), we build on the seminal work by Forbes and Milliken (1999) and focus on several intermediate board processes that might link women on boards and corporate financial performance and that at the same time might be captured by board attendance. With respect to the latter (the “when”), we refer to the concept of “tokenism” (Kanter, 1977) and focus on the problems that might arise if there is only one “token” woman in the boardroom and no further woman.

In summary, our contribution to the literature is threefold: *Firstly*, from a theory perspective, explore the black box around the

intermediate processes on the board that link board composition and board performance (Forbes & Milliken, 1999) by relating female board representation to a set of intermediate board processes (i.e., the presence and use of *knowledge and skills*, *board effort norms*, and *cognitive conflicts*) and by arguing that board attendance reflects important aspects of these intermediate processes. As a result, we derive a conceptual input-process-output model where board attendance mediates the link between female board representation and corporate financial performance. Additionally, we theoretically explore how “tokenism” (Kanter, 1977) surfaces as a behavioral context that influences group dynamics and processes in the boardroom as highlighted by Forbes and Milliken (1999) and that represents an important boundary condition of the postulated mediation.

*Secondly*, we are the first to empirically test a mediating effect of board attendance on the link between women directors and corporate financial performance, and we are the first to explore the role of nonlinearities of women's board room representation in that mediation. Our quantitative empirical analysis is based on data from German supervisory boards. In a two-tier board system as in the German one, the supervisory board is strictly separated from the executive board. Its task, however, is similar to the one of outside directors in a one-tier board system in that the supervisory board advises and monitors the executive board (Dittmann et al., 2010).

*Thirdly* and from a methodological perspective, our design where we use insights from a qualitative interview study to substantiate our theoretical claims (see McDonald & Westphal, 2013 for a similar procedure) and subsequently test our model with the help of quantitative data allows us to not only analyze *whether* the link between women directors and corporate financial performance is mediated by board attendance but rather also hints at *why* and *when* this link comes about. By integrating qualitative and quantitative evidence, our study overcomes the traditional polar methodologies (e.g., Currie et al., 2009; McNulty et al., 2013; Onwuegbuzie & Leech, 2005).

## 2 | INSTITUTIONAL CONTEXT: CO-DETERMINED SUPERVISORY BOARDS

Our research is embedded in the German corporate governance system that is characterized by a two-tier board structure. More specifically, our analysis focuses on the non-executive, supervisory board and not on the management board. The supervisory board is strictly separated from the management board; there is no overlap in memberships within the same firm at the same time. The task of the supervisory board is to counsel and monitor the management board and is thus comparable to the one of outside directors in one-tier board systems (Dittmann et al., 2010). Most importantly, the supervisory board appoints and dismisses the management board and sets its pay (Jäger et al., 2021). The two-tier board structure can be found in many countries all over the world (see, e.g., Bozhinov et al., 2021; Gerner-Beuerle & Schuster, 2013).

Depending on firm size, German supervisory boards are co-determined; that is, a certain fraction of its members is not elected by the

shareholders of the firm but represents its employees. Co-determination of supervisory boards is legally binding for German firms with at least 500 employees. In firms with more than 500, but less than 2000 domestic employees, one third of the supervisory board directors are employee representatives (One Third Participation Act). In firms with 2000 or more domestic employees, 50% of the supervisory board directors are employee representatives (Parity Co-Determination Act). Again, co-determined supervisory boards can be found in several countries outside Germany (see, e.g., Bozhinov et al., 2021).

At the time where our quantitative and qualitative data come from, there were no regulations in Germany concerning the representation of women on supervisory boards.

### 3 | THEORY AND HYPOTHESES

Our hypotheses build on two theoretical pillars: (1) the work by Forbes and Milliken (1999) on intermediate board processes that link board composition and board performance and (2) the concept of “tokenism” (Kanter, 1977) where tokenism posits that when there is only one minority member in a group that this minority member will be viewed as a “symbol” or “token,” that is, as a representative of the minority group rather than as an individual (Gabaldon et al., 2016, p. 373).

We complement our theoretical analysis with a qualitative in-depth interview study with 17 board members from German supervisory boards that we undertook to further enhance our understanding of the intermediate board processes.<sup>1</sup>

#### 3.1 | Intermediate board processes that link women directors and corporate financial performance

In their seminal paper, Forbes and Milliken (1999) emphasize the presence and use of *knowledge and skills*, *board effort norms*, and *cognitive conflicts* as intermediate board processes that might link board composition and board performance and then ultimately also corporate financial performance: Firstly, board composition affects the spectrum of *knowledge and skills* that the board has access to, and—provided that the knowledge and skills are actually put into use—board composition then also affects board performance by affecting the spectrum of knowledge and skills. Secondly, board composition might affect *board effort norms*. Forbes and Milliken (1999, p. 493) define effort norms as “a group level construct that refers to the group’s shared beliefs regarding the level of effort each individual is expected to put forward to a task.” Because most directors have another primary affiliation and face competing demands for their time, board effort norms will in fact be an important driver of board performance. Thirdly, board composition might affect *cognitive conflicts* being defined as task-related disagreements among group members. Cognitive conflicts involve “critical and investigative interaction processes” (Amason, 1996,

p. 124) and result in the “consideration of more alternatives and a more careful evaluation of alternatives” (Forbes & Milliken, 1999, p. 494) and thus are also linked to board performance. As board performance positively links to corporate financial performance, board composition will then ultimately also affect corporate financial performance.

Applying the above to our specific research question on the link between women directors and corporate financial performance, we next elaborate on the links between women directors and the three said intermediate board processes. In so doing, we refer to existing literature and underpin our argumentation with anchor quotes from our explorative qualitative interview study.

Starting with the presence and use of *knowledge and skills*, it has been repeatedly argued in the literature that women directors add a different expertise in terms of knowledge and skills and also in terms of their own unique networks to the boardroom (see e.g., Ali et al., 2014; Biggins, 1999; Hillman et al., 2007; Huse & Solberg, 2006). That is, women directors enlarge the spectrum of knowledge and skills that are present in the boardroom and that are thus in generally accessible to fulfill the board’s task. For instance, one of our interviewees states:

I would say that [women], of course, also bring in other aspects, other experiences [...] That means, primarily I would say, different points of view (Interview 13).

Similarly, interview partner #15 highlights that more diversity in the boardroom adds new perspectives and prevents the board from always using the very same approach:

And what they always experience when they bring diversity into their boards ... is that new perspectives emerge. So often the men go into a topic very precisely with the same approach (Interview 15).

If these different skills, perspectives, and experiences that women bring into the boardroom are then also put to a use, this broader spectrum of resources in terms of knowledge, skills, and also connections can be expected to also enhance board task performance. While an increased board diversity might in general also adversely affect the use of knowledge and skills (see, e.g., the argumentation by Forbes & Milliken, 1999), qualitative studies on *gender* diverse boards have repeatedly pointed to women directors contributing to a boardroom atmosphere that actually enhances boardroom exchange (see e.g., Huse & Solberg, 2006; Joecks et al., 2019; Kakabadse et al., 2015; Nielsen & Huse, 2010). Likewise, also our interviewees hint at women directors potentially fostering a climate that enhances the exchange and use of diverse knowledge and skills. For instance, one interview partner states:

So, the whole thing has become more polite, friendlier, and [...], I think it has changed from the tone of voice as well (Interview 1).

Importantly, the change in atmosphere is not only noted by our female interview partners (in terms of second-hand information), but it is also directly conveyed by our male interview partners. For instance, one male interview partner states:

The atmosphere, the togetherness is different. And, it's more productive. [...] As soon as a woman is in the room, a different tone prevails, a different way of dealing with each other prevails. And, men among each other are like hyenas, and no one grants the other the dirt under the fingernail. [...] This balm among the men can already be quite a pain in the ass (Interview 6).

As a consequence, we expect the presence of women directors to contribute to an enhanced knowledge and skill base and to also support the use of this enhanced knowledge and skill base via their positive effect on boardroom climate and atmosphere.

When it comes to the second intermediate process, *board effort norms*, qualitative evidence on boards has repeatedly found that women directors are better prepared than their male counterparts (see, e.g., Huse & Solberg, 2006) and that they often more actively participate in discussions (Schwartz-Ziv, 2017). Some of our interview partners support this view. For instance, one (female) interview partner states that the women directors “are better prepared” (Interview 17). Likewise, a male interview partner posits:

Maybe women are, let's say, more reliable in terms of, obligations. That could be it (Interview 3).

One of our interview partners renders an explanation for women directors potentially being more reliable and better prepared by referring to her own personal experience when she asked potential women candidates to join a supervisory board:

Women think, “Do I have the time for it?”, “Can I do it?”, “Can I really do it?”, “Am I qualified for it?” Then I always look very angry and say: “A male colleague never says that to me ‘Am I qualified?’” [laughs]. But women really think about whether they are qualified. [...] I believe that it is this sense of duty that women also say: “If I do it, I'll do it right” and not “by the way” (Interview 17).

Effort norms in a gender diverse board might hence be stronger than in an all-male board—particularly if one takes into account that introducing directors with higher effort norms might generate group dynamic effects (Carter et al., 2010; Westphal & Milton, 2000; Zhu et al., 2014). If men directors observe their female peers to be more dutiful and to be characterized by stronger effort norms, they might also change their behavior and attend the board meetings more regularly and be better prepared (for evidence on male directors changing their behavior in the presence of women directors, see,

e.g., Bilimoria, 2000; Fondas & Salsalos, 2000; Singh et al., 2008). As one interview partner puts it:

Yes, and as I said, this gives the impression right from the start that the women take it more seriously than the men. And then, I could imagine, if we then have two or three women on the supervisory board who take that seriously and who always go there, that it might encourage the others to be a bit more on schedule (Interview 1).

Referring to *cognitive conflicts*, the different perspectives and viewpoints that are added to the board in a gender diverse as opposed to an all-male board (see e.g., Fondas & Salsalos, 2000; Zelechowski & Bilimoria, 2004) will, in general, also lead to task-related, cognitive conflicts and thus enhance board task performance. One of our interview partners strongly supports this view:

Then, you need, I think, an openness to the various people sitting at the table. And you also need a hardness in some cases [...] a certain, quite productive willingness to engage in conflict when difficult or controversial issues arise. This should, of course, be coupled with a willingness to cooperate and a fundamental recognition that everyone at the table has their legitimate function there ... (Interview 7).

Women directors might foster such a productive critical exchange of different viewpoints (see, e.g., Campbell & Mínguez-Vera, 2008): As qualitative studies on gender diverse boards have shown, women directors are characterized by a more interrogative, questioning style than their male counterparts (see, e.g., Apesteguia et al., 2012; Burgess & Tharenou, 2002; Burke, 1997). Accordingly, one of our interview partners states: “Well, the women are very attentive and ask questions” (Interview 17). Similarly, one male interview partner says: “To be honest, it must also be said that women also dare more in this context, and ask questions” (Interview 8). Women directors, however, do not only seem to foster the critical exchange and evaluation of ideas, they apparently also help to solve conflicts and find solutions in muddled situations, as the same interview partner further highlights:

And one notices or I have often noticed that the women we had on the supervisory board were a bit like the icebreaker, that often a solution was found with the women, [...] that was one, two, three, no, three to four times the case, I say so, where I noticed it very positively (Interview 8).

That is, women directors might positively affect task performance via fostering task-related and hence productive, cognitive conflicts and also by contributing to solving those conflicts.

Summing up, we expect women directors to positively affect the presence and use of *knowledge and skills*, *board effort norms*, and

*cognitive conflicts* that, in turn, positively affect board performance and ultimately also corporate financial performance.

### 3.2 | Board attendance as a proxy for the intermediate board processes

Since the intermediate board processes are latent constructs that are difficult to observe, we propose to use board attendance as a proxy for those intermediate processes. In what follows, we elaborate on how board attendance might capture the intermediate board processes, and we again underpin our argumentation with anchor quotes from our explorative interview study.

With respect to the presence and use of *skills and knowledge*, it is clear that, when the board is incomplete, the full spectrum of perspectives, abilities, and expertise of its members cannot be used to effectively perform its monitoring and consultation tasks. That is, a low attendance adversely affects the presence and use of skills and knowledge. A high attendance rate, to the contrary, allows the board to effectively use all of its members' skills and abilities. While obviously not a sufficient condition for the use of knowledge and skills, a high attendance rate increases the chances of a wider spectrum of knowledge and skills being used. The importance to use other board members' knowledge and expertise is, for instance, highlighted by one of our interview partners who explicitly refers to the link between board attendance on the one hand and the spectrum of ideas that are being expressed and the questions that are being asked on the other. He states:

The best decisions [...] were taken, if there was the greatest possible participation in the supervisory board and a lot of different questions from employees, shareholders, majority group etc. [were asked], so the more questions, [...] the clearer and clearer the result became later (Interview 8).

That is, our interview partners support the view that attendance is linked to the presence and use of different knowledge and skills and that this access to different knowledge and skills has the potential to enhance board task performance. Secondly, a high attendance rate might be taken as indicative of strong *board effort norms* and thus affect task performance. When board effort norms are strong, this will most likely be reflected in a high attendance rate. Again, simply attending board meetings will clearly not be enough in terms of the effort that board members should invest for the board to achieve a high level of task performance. Likewise, not attending a particular board meeting might not necessarily mean that the respective board member is characterized by low effort norms, since there always might be other obligations, as, for instance, our interview partners #13 and #15 highlight. But, obviously, an overall low board attendance rate would rather be indicative of weak effort norms. As one of our interview partners puts it:

Board attendance “says something about how seriously people take the board work.” [...] you can deduce something about the recruitment quality of the supervisory board members (Interview 7).

Similarly, another interview partner states that she would tie high attendance rates to a “strong identification with the company” (Interview 9), and, likewise, another interview partner argues that a high attendance rate “documents the seriousness of board members' interest” (Interview 13) in their task and in the company.

Accordingly, one interview partner states:

The question “How high is the presence?” at supervisory board meetings is a decisive factor for how high the priority of the work of the supervisory board is among the individual members. [...] Each of us has twenty-four hours a day. And each one of us doesn't do things. And then it always depends on what things you take care of and do (Interview 4).

Thus, a high attendance rate is held to be indicative of strong board effort norms by our interview partners, whereas a low attendance rate might indicate that board members “have lost interest in the company” (Interview 7).

Thirdly, a high attendance rate enables the board to include multiple viewpoints and to engage in a critical and careful evaluation of alternatives. If board members do not show up for the meetings, they cannot express their viewpoints, ask questions, and engage in critical discussions. That is, also with respect to *critical conflicts*, board attendance is crucial. Accordingly, our interview partners repeatedly emphasize that “asking critical questions” (Interview 2) and “discussing conflict points back and forth” (Interview 9) are crucial for an effective board work. Or, as one of our interview partners puts it, “You have to go through the discussion” (Interview 17). Likewise, another interview partner asserts that the quality of boardroom discussions is indicative of board members' “reflectivity,” their “cross-fertilization,” and an overall “agile board” (Interview 14). All of these, she argues, are important in terms of board task performance.

Summing up, we expect board attendance to reflect important aspects of the latent intermediate processes that link board composition and board task performance (and ultimately then also corporate financial performance). Specifically, a high board attendance makes it more likely that the full spectrum of board members' knowledge and skills is used, it might reflect strong board effort norms, and it enhances the likelihood of critical conflicts. By thus being linked to the intermediate board processes, we expect board attendance to mediate the link between women directors and corporate financial performance. Our first hypothesis thus reads:

**Hypothesis H1.** The positive link between women directors and corporate financial performance is mediated by board attendance.

### 3.3 | Nonlinearities of female boardroom representation, intermediate board processes, and corporate financial performance

Besides establishing the link between women directors, board attendance, and corporate financial performance, we also seek to explore whether the postulated mediation is contingent on the number of women in the boardroom. If this were the case, this would hint towards a potentially important boundary condition of our mediation model and would thus have important policy implications.

A theoretical rationale for the effect of women directors to be contingent on their number in the boardroom is provided by tokenism (Kanter, 1977). When there is only one woman in the boardroom, she might be regarded as a “token”; that is, she might be treated as representative for her category and not as an individual (Gabaldon et al., 2016, p. 373). Tokens are “easily marginalized”; they are “often doubted and not trusted” (Torchia et al., 2011, p. 301), making it difficult for them to be heard and listened to as equals (Terjesen et al., 2009, p. 328).

As a result, tokens often experience discomfort, isolation, and self-doubt (Kanter, 1977), they do not identify strongly with the group (Jonsdottir et al., 2015), and they “communicate less and engage more frequently in withdrawal behavior” (Schwab et al., 2016, p. 9). Correspondingly, one of our interview partners states: “The women who are in there don't say a word” (Interview 3). And interview partner #9 describes: “Requests to speak are predominantly ... male” (Interview 9).

However, when the number of minority members in a group increases, their perspective changes and also the relations between members of the minority and the majority group change as well (Torchia, 2013). In the presence of other women, then, women directors are more likely to share their ideas, self-censorship and withdrawal are less likely, and divergent thinking is enabled (Schwab et al., 2016, p. 11).

Further, women directors will be able to ally with one another and thus avoid not being heard (see, e.g., Huse & Solberg, 2006; Nielsen & Huse, 2010; Kakabadse et al., 2015). This is also highlighted by one of our interview partners:

That's actually how it was at [company name]. When I started there, I had a female colleague. She left at some point. Then I was the only woman there for quite a while. And then, for the last three years, another woman joined me ... And that changed a lot. [...] It was a bit like “the minority is joining forces”... (Interview 1).

Similarly, interview partner #5 states:

I made the experience, when I was the first and also the only woman in the boardroom that I had to talk also in between. I have learned that if I only spoke when requested, then I was sometimes overlooked ... (Interview 5).

Interview expert #15 outlines that it is sometimes difficult for a woman director to contribute to boardroom discussions since she might experience skepticism by her male colleagues, be regarded as “weird at first sight” and “not conform to the mainstream” (Interview 15)—especially when she is the first and only woman in the boardroom. Correspondingly, Erkut et al. (2008) found that, whenever there is more than one woman in the boardroom, women are less likely to be overheard, comments by women are less likely dismissed by their male colleagues, and the culture is perceived to be more open for discussions. As a consequence, women feel more comfortable, and they are less concerned about what their male colleagues would think.

Explicitly referring to the dynamics, interview expert #15 states that “only over time” her male colleagues learned to “listen very intensely, even if the ‘green little alien’ came around the corner” and to acknowledge that “yes, she has said something clever a few times.” Once there is more than one woman in the boardroom, board processes might truly start to change, as the same expert explains:

People notice the effect of diversity when they have more than one woman [...]. If it's amplified from several corners, then you actually start to think sometimes, to think differently, to pursue a creative idea sometimes that would otherwise not have been followed. So, I experience this particularly in the supervisory boards, where we are already more women, that you actually feel this attitude that I know from the past, this form of diverse committee work. I do not mean those situations where I am a lonely caller in the desert (Interview 15).

As a result, we postulate that the mediation postulated in Hypothesis H1 only holds if there is more than one “token” woman in the boardroom:

**Hypothesis H2.** The positive link between women directors and corporate financial performance is mediated by board attendance, if there is more than one woman in the boardroom.

## 4 | QUANTITATIVE STUDY

### 4.1 | Sample

For our quantitative analysis, we collected data from German listed firms. Our initial sample consists of the 110 companies listed in one of the German stock exchange indices DAX30, MDAX50, and TecDAX30 on December 31, 2015, over an 11-year period (2005–2015). Reporting board attendance is on a voluntary basis, with 60 companies reporting average yearly attendance rates at board level for at least 1 year. For our identification strategy, it is important to use time lags in our analysis (see below), which leaves us with 44 companies and 149 observations.

Concerning a potential selection bias, we applied Heckman's (1979) two-stage model to ensure that our results were not biased because of any unmeasured differences between firms reporting attendance rates and those not reporting attendance rates. For our two measures of corporate financial performance, return on assets (ROA) and Tobin's Q, the inverse Mill's ratios ( $\beta = .34$ , s.e. = 2.02, n.s. for ROA and  $\beta = .18$ , s.e. = 0.23, n.s., for Tobin's Q) were not significant for our regression models. Hence, we conclude that our sample does not suffer from a selection bias. However, the 44 companies in the reduced sample are, on average, a bit younger than those of the 110 companies in the full sample; board members have a longer shared experience; and the industry distribution is slightly different with more companies in the reduced sample operating in utilities and transportation and less in finance, as compared to the full sample.

## 4.2 | Main variables of interest

According to our mediation model (Hypothesis H1), our three main variables of interest are women directors, board attendance, and corporate financial performance. In our baseline estimations, the representation of women directors is measured by the share of women directors on the board in a given year (women—percent). To test Hypothesis H2 and thus dig deeper into the postulated nonlinearities of female boardroom representation, we employ a set of dummy variables capturing whether a board has only one woman, two women, or three or more women directors: The dummy variable 1 woman assumes the value “1” if a board in a given year has one woman and “0” otherwise; the dummy variable 2 women assumes the value “1” if a board in a given year has two women and “0” otherwise; and the dummy variable 3+ women assumes the value “1” if a board in a given year has three or more women and “0” otherwise. We further differentiate the case where there is more than one woman in the boardroom and distinguish a situation where there are two women in the boardroom from a situation where there are three or more women in the boardroom because in literature three or more women are often considered the so-called “critical mass” (see, e.g., Erkut et al., 2008; Kramer et al., 2006). The data on the gender composition of boards were hand-collected from firms' annual reports (for the details of the data collection see Weckes, 2016).

Information on the average board attendance rate in a given year (attendance) is taken from Asset4, a database provided by Thomson Reuters. It is measured as the average share of board members attending the board meetings in a given year.

Corporate financial performance is measured in two different ways: by use of an accounting-based measure and additionally by a market-based measure to take account of potentially varying results with respect to accounting versus market-based measures (Carter et al., 2003; Haslam et al., 2010; Smith et al., 2006). We use ROA as a well-established accounting-based measure (e.g., Combs et al., 2005; He & Huang, 2011; Mahadeo et al., 2012; Nadkarni & Herrmann, 2010; Post & Byron, 2015) and Tobin's Q as a

well-established market-based measure of performance (e.g., Aouadi & Marsat, 2018; Bennouri et al., 2018; Jeong & Harrison, 2017). The data on ROA and Tobin's Q are taken from Thomson Reuters Datastream.

### 4.2.1 | Control variables

We include two sets of control variables: board level variables and firm level variables. At the board level, we control for *board size* (measured by the number of board members in a given board in a given year), since group size can be expected to affect group processes (Gladstein, 1984; Haleblan & Finkelstein, 1993). Likewise, the number of meetings might also affect group processes, and it might also affect board attendance (e.g., Adams & Ferreira, 2009; Masulis et al., 2012). To capture a potential nonlinear effect, we create a variable *board meetings<sup>2</sup>* and also include this variable in the regression analysis. Even though the legally required number of board meetings per year is only two (§110, Aktiengesetz), in our data set, the minimum number of board meetings per year is four. Further, we control for the average co-working experience (shared experience) because shared experience will also affect group processes (see, e.g., Tian et al., 2011). Following previous research (see e.g., Barkema & Shvyrykov, 2007; Carroll & Harrison, 1998; Tian et al., 2011), we calculate shared experience as the overlap in director's board tenures:

$$\text{Shared experience} = \text{tenure overlap} = \frac{1}{n} \sum_{i \neq j} \min(u_i, u_j)$$

where  $u_i$  is the board tenure of director  $i$  and  $n$  is the number of pairwise comparison. Further, we control for multiple directorships since multiple directorships will be linked to board members' experience, knowledge, and skills (see, e.g., Sarkar & Sarkar, 2009), but it might also negatively affect board monitoring because directors with multiple directorships might face more severe time constraints (see, e.g., Fich & Shivdasani, 2006). We measure multiple directorships as the average number of supervisory board memberships a board member holds in one of the 110 listed companies in our data set—besides the one in the board under consideration. Further, we include a control variable capturing the percentage of shareholder representatives on the board (shareholders) taking account of the fact that in German supervisory boards, depending on the specific regulation, up to 50% of seats are taken by employee representatives. In our data set, shareholders either represent two-thirds of board members (firms covered by the German One-Third Participation Act 2004), half of board members (firms covered by the German Codetermination Act 1976 or the German Steel and Coal Codetermination Act 1951, respectively), or all board members (firms not covered by either of the above legislations). At firm level, in addition to including year and industry dummies, we control for firm age (measured as the number of years since the firm was established), thus tying in with the literature that stresses the importance to control for the life-cycle of a company (see, e.g., Lynall et al., 2003). As a second control variable at firm level, we use the



natural logarithm of annual sales  $\ln$  sales as a measure of firm size (e.g., Green & Homroy, 2018; Marinova et al., 2016). At the firm level, we further control for the presence of at least one woman in the management board by including a corresponding dummy variable in our analyses. In our data set, the maximum number of women in the management board is 2, which is comparable to the value in Bozhinov et al. (2021). Information on board level controls is taken from the data hand-collected by Weckes (2016), and information on the firm level controls is taken from Thomson Financial Datastream, BoardEx and hand-collected from firms' annual reports.

### 4.3 | Methodology

For our analysis, we first employ hierarchical multiple regressions to analyze the mediating effect of board attendance on the link between women directorship and subsequent corporate financial performance (Hypothesis H1). We perform a three-step mediation analysis, as specified by Baron and Kenny (1986). Last, we run a Sobel test (Sobel, 1982, 1986) to assess the significance of the mediation effect (see Hasan et al., 2018 or Miller et al., 2007 for a similar procedure).

One challenge for our analysis is the time structure of the attendance–performance link. To address this problem, we use panel estimations and lag our central explanatory variables women–percent, 1 woman, 2 women, 3+ women, and attendance by 2 years. Further, we also lag board size, board meetings, board meetings<sup>2</sup>, shared experience, multiple directorships, and shareholders by 2 years as they are potentially related to our central explanatory variables. A similar approach is used by Farrell and Hersch (2005) and by Dittmann et al. (2010). We use a 2-year lag structure because it will typically take some time until the presence of (more) women directors will affect corporate financial performance. This is also highlighted by our conceptual model: Upon entering the boardroom, women directors might well immediately affect the intermediate boardroom processes, but it will certainly take some time until (a) board performance and (b) corporate financial performance are affected. In addition, we also experimented with alternative lag structures. Our results are qualitatively robust to a 1-year lag structure and—with respect to our accounting-based performance measure ROA—also for a 3-year lag structure. Because some companies in our data set report their board attendance for only 1 or 2 years, we have an unbalanced panel with a large  $N$  (number of companies) and a small  $T$  (time periods). Therefore, for our sample companies, some of our independent variables do not vary over time. For this reason, we apply random effects regressions with time-fixed effects. Applying a Hausman (1978) specification test, we find no systematic difference between the fixed-effects and the random-effects estimation.

In addition, to address a potentially reversed causality (see Engle et al., 1983; Jeong & Harrison, 2017), we test for strict exogeneity of our explanatory variables for women directors (women–percent and the dummy variables for the different numbers of women in the boardroom) and find women directors to be exogenous in all specifications. Specifically, we examine the relations between prior-period

corporate performance (ROA and Tobin's  $Q$ ) and women directors by taking the 2-year and 1-year lead of the variables for women directors. The effects are not statistically significant, and moreover, the coefficients are negative—speaking against an alternative (reverse causation) explanation of our results.

To further account for potential endogeneity, we test for the impact threshold of a confounding variable (ITCV). The ITCV offers a possibility to check how highly correlated an omitted variable would need to be to have an effect on the results (Busenbark et al., 2017, 2019; Frank, 2000; Gamache et al., 2019; Harrison et al., 2018; Hubbard et al., 2017; Oliver et al., 2018). The results of our ITCV test show that an omitted variable would have to be correlated at .21 with both our central explanatory variable (women–percent) and our dependent variable ROA to invalidate an inference. To be a concern for the interpretation of our results, 22.08% of the estimate would have to be due to bias. For our dependent variable Tobin's  $Q$ , an omitted variable would have to be correlated at .182 with both women–percent and Tobin's  $Q$ , and 17.21% of the estimate would have to be due to bias. To put this into perspective, we would need a correlated omitted variable with an effect as high as our mediator variable “board attendance” to bias our parameter estimates, thus strengthening the causal interpretation of our results.

### 4.4 | Descriptive statistics

Table 1 contains the means and standard deviations for all the variables included in our quantitative analysis. Mean ROA in our sample is 5.73 with a standard deviation of 4.88. Mean Tobin's  $Q$  in our sample is 1.58 with a standard deviation of 0.83. The average share of women on boards (women–percent) is 9.93%. The highest share of women on a given board is 37.5%. Among our 149 firm-year observations, in about 34%, there is 1 woman; in 16%, there are 2 women; and in 21%, there are 3+ women in the boardroom. In the remaining 29% firm-year observations, there are no women in the boardroom. Average board attendance is 82.89% and varies between 50% and 100%. Average board size is 13.81, ranging from 3 to 21 board members. Average number of board meetings is 5.7 per year ranging from the minimum of 4 to a maximum of 12. Average shared experience of the board members is 5.75 years, ranging from 2.29 years to almost 8.4 years. Concerning multiple directorships, the average number of outside directorships in one of the 110 boards of our initial sample is 1.38, and shareholders represent on average 63% of supervisory board members.  $\ln$  sales is on average 16.02 (with average sales amounting to about 24 million Euros). Average firm age is 86 years; 14% of the companies have at least one woman in their management board. As to the industry distribution, the by far largest percentage of firms in our sample belongs to manufacturing (56%), followed by transportation (19%) and utilities (7%).

Table 2 shows the Pearson correlation matrix. The pairwise correlations among all explanatory variables are a first check for multicollinearity. As a rule of thumb, an indication of potential multicollinearity

**TABLE 1** Descriptive statistics.

Variable	Obs.	Mean	SD	Min	Max
Dependent variables					
ROA	149	5.73	4.88	−5.8	27.57
Tobin's Q	149	1.58	0.83	0.78	5.71
Explanatory variables					
Women—percent (t-2)	149	9.93	8.43	0	37.5
1 woman (t-2)	149	0.34	0.47	0	1
2 women (t-2)	149	0.16	0.37	0	1
3+ women (t-2)	149	0.21	0.41	0	1
Attendance (t-2)	149	82.89	20.62	50	100
Control variables					
Board size (t-2)	149	13.81	5.66	3	21
Number of meetings (t-2)	149	5.70	1.70	4	12
Shared experience (t-2)	149	5.75	1.39	2.29	8.4
Multiple directorships (t-2)	149	1.38	0.29	1	2.5
Shareholders (in percent) (t-2)	149	62.96	18.93	50	100
Woman in management board- (dummy)	149	0.14	0.35	0	1
ln sales	149	16.02	1.45	12.34	19.13
Firm age	149	85.5	52.96	11	171
Industry dummies					
Manufacturing	149	0.56	0.49	0	1
Utility	149	0.07	0.25	0	1
Transportation	149	0.19	0.39	0	1
Bank savings loan	149	0.03	0.17	0	1
Other services	149	0.06	0.24	0	1

**TABLE 2** Pearson correlation matrix.

	1	2	3	4	5	6	7	8	9	10	11
1 ROA	1										
2 Tobin's Q	.66***	1									
3 Women—percent (t-2)	.08	.04	1								
4 Attendance (t-2)	.23***	.21***	.20**	1							
5 Board size (t-2)	.46***	−.53***	.25***	−.05	1						
6 No of meetings (t-2)	−.03	−.03	.14	.14	−.09	1					
7 Shared experience(t-2)	.21***	.16 *	−.33***	−.08	−.27	−.21**	1				
8 Multiple directorships (t-2)	−.09	−.06	−.16*	−.14*	.17*	−.01	−.05	1			
9 Shareholders (t-2)	−.17**	.32***	−.40***	.122	−.58***	.006	.22***	−.16*	1		
10 ln sales	−.38***	−.44***	−.08	−.08	.57***	.10	−.09	.43***	−.23***	1	
11 Firm age	−.22***	−.33	−.08	−.08	.27***	−.19**	−.14*	.26***	−.32***	.27***	1

\*\*\*Statistically significant at the 1% level.

\*\*Statistically significant at the 5% level.

\*Statistically significant at the 10% level.

are values of 0.7 or higher. In our sample, there are no values higher than 0.7. We additionally examined the variance inflation factors (VIFs) for all of our estimation models. As all VIF values were below 4.72, we do not expect our findings to be distorted by multicollinearity (Cohen et al., 2014; Liu et al., 2014; O'Brien, 2007).

## 4.5 | Results

Tables 3 and 4 present the results of the random effects hierarchical regression analyses, using the share of women (women—percent) as the main explanatory variable.

	(1) ROA	(2) Attendance (t-2)	(3) ROA	(4) ROA
Women—percent (t-2)	0.13** (0.06)	0.57* (0.30)		0.11** (0.06)
Attendance (t-2)			0.05*** (0.01)	0.04*** (0.01)
Board size (t-2)	-0.37*** (0.14)	-0.05 (0.54)	-0.38 (0.33)	-0.36*** (0.14)
No of meetings (t-2)	-0.32 (0.66)	1.58 (5.12)	0.63 (0.63)	-0.07 (0.63)
No of meetings <sup>2</sup> (t-2)	0.014 (0.04)	-0.12 (0.38)	-0.05 (0.04)	-0.001 (0.04)
Shared experience (t-2)	0.38 (0.33)	0.24 (2.26)	0.16 (0.27)	0.39 (0.32)
Multiple directorships (t-2)	-0.13 (2.09)	-2.95 (6.80)	0.199 (2.321)	0.08 (2.16)
Shareholders (t-2)	0.01 (0.06)	0.17 (0.15)	0.15 (0.51)	0.0002 (0.06)
Woman in management board (dummy)	0.43 (0.87)	4.39 (6.59)	1.57 (1.30)	0.45 (0.89)
In sales	-0.21 (0.53)	0.16 (1.80)	-0.49 (0.54)	-0.25 (0.52)
Firm age	-0.01 (0.01)	-0.02 (0.05)	-0.003 (0.01)	-0.004 (0.01)
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Constant	10.12 (8.43)	98.12*** (28.43)	9.92 (7.39)	8.64 (7.24)
R <sup>2</sup>	0.34	0.25	0.33	0.39
Number of firms	44	44	44	44
N	149	149	149	149
Hausman test	ns	ns	ns	ns
Sobel test				$p < .1$
Indirect effect				0.028
Direct effect				0.114
Total effect				0.142
Mediated total effect				19.71%

**TABLE 3** Random effects regressions: Women directors, board attendance, and ROA.

Note: Numbers in parentheses are standard errors based on robust standard errors clustered at the firm level.

\*\*\*Statistically significant at the 1% level.

\*\*Statistically significant at the 5% level.

\*Statistically significant at the 10% level.

With respect to the share of women directors (women—percent), the results of the first step (Models 1 in Tables 3 and 4) show that the percentage of women on boards is positively related to subsequent corporate financial performance as measured by ROA (Table 3,  $b = 0.13^{**}$ ) and Tobin's Q (Table 4,  $b = 0.08^{**}$ ) when controlling for a whole set of variables at firm and board level but excluding attendance. In terms of magnitude, the results indicate that a 1% increase in the share of women directors is associated with a 0.13 unit increase in ROA and a 0.08 unit increase in Tobin's Q. That is, based on mean ROA (=5.73), it is an increase of 2.22%, and based on mean

Tobin's Q (=1.58), it is an increase of 5.06%. While the effect size might appear high, its magnitude is in line with other studies' findings: For instance, Terjesen et al. (2016, p. 464) find a 1% increase in the share of women on board to result in a 3.5% increase in Tobin's Q.<sup>2</sup>

Tables 3 and 4 also provide the results of the second step of our hierarchical regression analyses (Models 2). We find that the larger the percentage of women on the board, the higher is the attendance rate at board meetings ( $b = 0.57^*$ ). In terms of magnitude, this result indicates that a 10% increase in the percentage of women on the

**TABLE 4** Random effects regressions: Women directors, board attendance, and Tobin's Q.

	(1) Tobin's Q	(2) Attendance (t-2)	(3) Tobin's Q	(4) Tobin's Q
<i>Women—percent (t-2)</i>	0.08** (0.04)	0.57* (0.30)		0.08** (0.04)
<i>Attendance (t-2)</i>			0.004** (0.002)	0.004* (0.002)
<i>Board size (t-2)</i>	-0.06** (0.02)	-0.05 (0.54)	-0.05** (0.02)	-0.055** (0.02)
<i>No of meetings (t-2)</i>	0.03 (0.13)	1.58 (5.12)	0.12 (0.12)	0.06 (0.13)
<i>No of meetings<sup>2</sup> (t-2)</i>	-0.004 (0.008)	-0.12 (0.38)	-0.009 (0.008)	-0.005 (0.008)
<i>Shared experience (t-2)</i>	0.01 (0.06)	0.24 (2.26)	-0.01 (0.05)	0.01 (0.06)
<i>Multiple directorships (t-2)</i>	0.06 (0.30)	-2.95 (6.80)	0.05 (0.33)	0.08 (0.31)
<i>Shareholders (t-2)</i>	0.003 (0.01)	0.17 (0.15)	0.0004 (0.007)	0.003 (0.01)
<i>Woman in management board (dummy)</i>	0.067 (0.121)	4.39 (6.59)	0.082 (0.124)	0.072 (0.125)
<i>In sales</i>	-0.04 (0.10)	0.16 (1.80)	-0.05 (0.10)	-0.05 (0.10)
<i>Firm age</i>	-0.003 (0.002)	-0.02 (0.05)	-0.003* (0.00194)	-0.003 (0.002)
<i>Industry effects</i>	Yes	Yes	Yes	Yes
<i>Year effects</i>	Yes	Yes	Yes	Yes
<i>Constant</i>	2.69** (1.381)	98.12*** (28.43)	2.77* (1.45)	2.60* (1.38)
<i>R<sup>2</sup></i>	0.41	0.25	0.41	0.43
<i>Number of firms</i>	44	44	44	44
<i>N</i>	149	149	149	149
<i>Hausman test</i>	ns	ns	ns	ns
<i>Sobel test</i>				<i>p</i> < .1
<i>Indirect effect</i>				0.046
<i>Direct effect</i>				0.080
<i>Total effect</i>				0.126
<i>Mediated total effect</i>				36.50%

Note: Numbers in parentheses are standard errors based on robust standard errors clustered at the firm level.

\*\*\*Statistically significant at the 1% level.

\*\*Statistically significant at the 5% level.

\*Statistically significant at the 10% level.

board is associated with a 5.7 percentage point increase in board attendance.

In a third step of our hierarchical regression analyses, we analyze the relation between board attendance and ROA (Tables 3 and 5, Model 3) as well as the relation between board attendance and Tobin's Q (Tables 4 and 6, Model 3), each time controlling for a whole set of variables at firm and board level but excluding the variable for women's boardroom representation. We detect a statistically significant positive link between attendance and subsequent accounting-based as well as market-based corporate financial performance. A

10% increase in board attendance is associated with a 0.5 unit increase in ROA; that is, given mean ROA of 5.73, a 10% increase in board attendance is associated with a 9% increase in ROA. For Tobin's Q, a 10% increase in board attendance is associated with a 0.04 unit increase in Tobin's Q; that is, given mean Tobin's Q of 1.58, a 10% increase in board attendance is associated with a 2.3% increase in Tobin's Q.

In a last step of our hierarchical regression analyses, we regress ROA and Tobin's Q on the share of women directors, controlling for a whole set of variables at the firm and board level,

	(1) ROA	(2) Attendance (t-2)	(3) ROA	(4) ROA
1 woman (t-2)	0.88 (1.08)	<b>12.10*</b> (6.66)		0.37 (1.12)
2 women (t-2)	3.67** (1.53)	7.32 (7.72)		3.38** (1.54)
3+ women (t-2)	4.36** (1.85)	<b>13.78*</b> (7.70)		<b>3.78**</b> (1.87)
Attendance (t-2)			<b>0.05***</b> (0.01)	<b>0.04***</b> (0.01)
Board size (t-2)	-0.71* (0.38)	-1.32 (0.93)	-0.38 (0.33)	-0.653* (0.380)
No meetings (t-2)	-0.17 (0.70)	-6.35* (3.83)	0.63 (0.63)	0.104 (0.707)
No meetings <sup>2</sup> (t-2)	0.001 (0.05)	0.38 (0.26)	-0.05 (0.04)	-0.0154 (0.0460)
Shared experience (t-2)	0.34 (0.30)	0.24 (2.06)	0.16 (0.27)	0.328 (0.274)
Multiple directorships (t-2)	0.24 (2.16)	-3.53 (6.31)	0.199 (2.321)	0.413 (2.207)
Shareholders (t-2)	0.46 (0.52)	1.35 (1.08)	0.15 (0.51)	0.403 (0.519)
Woman in management board (dummy)	0.86 (1.20)	-2.12 (5.87)	1.57 (1.30)	0.975 (1.188)
In sales	-0.47 (0.48)	0.59 (1.81)	-0.49 (0.54)	-0.51 (0.47)
Firm age	0.003 (0.01)	-0.03 (0.05)	-0.003 (0.01)	0.004 (0.01)
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Constant	14.79** (7.083)	120.1*** (33.83)	9.92 (7.39)	9.54 (6.96)
R <sup>2</sup>	0.34	0.28	0.33	0.40
Number of firms	44	44	44	44
N	149	149	149	149
Hausman test	ns	ns	ns	ns
Sobel test				$p < .1$
Indirect effect				0.689
Direct effect				3.781
Total effect				4.47
Mediated total effect				15.41%

**TABLE 5** Random effects regressions: Dummies for the different number of women on the board, board attendance, and ROA.

Note: Numbers in parentheses are standard errors based on robust standard errors clustered at the firm level.

\*\*\*Statistically significant at the 1% level.

\*\*Statistically significant at the 5% level.

\*Statistically significant at the 10% level.

including attendance (Tables 3 and 4, Model 4). The models account for 39% of the variance in predicting ROA and 43% of the variance in predicting Tobin's Q. The coefficients of the share of women directors (women-percent) are statistically significantly positive ( $p < .05$ ), but their magnitudes ( $b = 0.11$  and  $b = 0.08$ ) decrease compared to the corresponding Model 1, where board

attendance was not included. Women-percent and attendance are both significant predictors of ROA as well as of Tobin's Q, with attendance acting as a mediator of the link between the share of women directors and subsequent accounting-based as well as market-based corporate financial performance, thus supporting Hypothesis H1.

**TABLE 6** Random effects regressions: Dummies for the different number of women on the board, board attendance, and Tobin's Q.

	(1) Tobin's Q	(2) Attendance (t-2)	(3) Tobin's Q	(4) Tobin's Q
1 woman (t-2)	0.02 (0.09)	<b>12.10*</b> (6.659)		-0.03 (0.09)
2 women (t-2)	0.05 (0.15)	7.32 (7.72)		0.03 (0.15)
3+ women (t-2)	<b>0.31*</b> (0.17)	<b>13.78*</b> (7.694)		<b>0.18</b> (0.18)
Attendance (t-2)			<b>0.004**</b> (0.002)	<b>0.004**</b> (0.002)
Board size (t-2)	-0.06** (0.03)	-1.32 (0.93)	-0.05** (0.02)	-0.06** (0.03)
No meetings (t-2)	0.07 (0.14)	-6.35* (3.83)	0.12 (0.12)	0.10 (0.14)
No meetings <sup>2</sup> (t-2)	-0.006 (0.009)	0.38 (0.26)	-0.009 (0.008)	-0.008 (0.008)
Shared experience (t-2)	0.04 (0.04)	0.24 (2.06)	-0.01 (0.05)	0.03 (0.04)
Multiple directorships (t-2)	0.05 (0.32)	-3.53 (6.31)	0.05 (0.33)	0.06 (0.32)
Shareholders (t-2)	0.002 (0.01)	1.35 (1.08)	0.0004 (0.007)	0.002 (0.007)
Woman in management board (dummy)	0.067 (0.123)	-2.12 (5.87)	0.082 (0.124)	0.07 (0.13)
In sales	-0.04 (0.10)	0.59 (1.81)	-0.05 (0.10)	-0.04 (0.10)
Firm age	-0.003 (0.002)	-0.03 (0.05)	-0.003* (0.00194)	-0.003 (0.00)
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Constant	3.254** (1.480)	120.1*** (33.83)	2.77* (1.45)	2.73* (1.45)
R <sup>2</sup>	0.40	0.28	0.41	0.43
Number of firms	44	44	44	44
N	149	149	149	149
Hausman test	ns	ns	ns	ns

Note: Numbers in parentheses are standard errors based on robust standard errors clustered at the firm level.

\*\*\*Statistically significant at the 1% level.

\*\*Statistically significant at the 5% level.

\*Statistically significant at the 10% level.

Since in our regression analyses for ROA, the coefficient for women—percent remains significantly different from zero after the inclusion of attendance but reduces in size; attendance only serves as a partial mediator of the link between women directors and subsequent accounting-based corporate financial performance. The mediated main effect is 19.71% (the ratio of the indirect effect of 0.028 and the total effect of 0.142). The Sobel test assesses the significance of the mediation effect. In our sample, we find a significant decline in the main effect from 0.142 (total effect) to 0.114 (direct effect) resulting in an indirect effect of 0.028. That is, the fact that women directors and subsequent accounting-based financial performance are

positively linked is only partially explained by the higher board attendance rates that, in turn, are associated with an increased share of women directors. The same holds true for our market-based performance measure Tobin's Q. The significant mediated main effect is 36.50% (the ratio of the indirect effect of 0.046 and the total effect of 0.126). That the postulated mediation is only *partial* may be explained by board attendance only *proxying* the intermediate board processes and also by the fact that women directors might additionally *directly* affect board performance beyond their effect via an enhanced board attendance. For instance, women directors have been found to more often come from outside the company and thus be

better equipped as monitors of the management board (see, e.g., Frye & Pham, 2018; Kesner, 1988; Schwartz-Ziv, 2017).

Tables 5 and 6 present the results of our mediation model using the dummy variables 1 woman, 2 women, and 3+ women instead of women—percent to further explore whether it makes a difference for the postulated effects if there is only one woman or if there are two women or three or more women directors.

The results of the first step (Models 1 in Tables 5 and 6) show that, when controlling for a whole set of variables at firm and board level, but excluding attendance, only a “critical mass” of three or more women on boards (3+ women) is positively related to subsequent corporate financial performance as measured by ROA (Table 5,  $b = 4.36^{**}$ ) and by Tobin's Q (Table 6,  $b = 0.31^*$ ). In addition, we find a positive effect of 2 women as opposed to no woman in the board room for our accounting-based measure ROA (Table 5,  $b = 3.67^{**}$ ) but not for our market-based measure Tobin's Q (Table 6,  $b = 0.05$ , n.s.). Having only one woman on board (1 woman) as opposed to no woman is neither related to ROA nor to Tobin's Q. We hence find that the positive link between women's boardroom representation and corporate financial performance depends on more than one woman being on the board. That is, our result supports those studies in the literature that only find a positive relation between women's representation on the board and subsequent corporate financial performance if the number of women exceeds a so-called “critical mass” or “magic number” (e.g., Arena et al., 2015; Joecks et al., 2013; Liu et al., 2014; Schwab et al., 2016; Schwartz-Ziv, 2017; Torchia et al., 2011).

When we regress ROA and Tobin's Q on the dummy variables for women's boardroom representation while controlling for attendance (Tables 5 and 6, Models 4), our models account for 40% of the variance of our accounting-based measure ROA and for 43% of the variance of our market-based performance measure Tobin's Q. The coefficients of 3+ women in Model 4 of Table 5 are statistically significantly positively related to ROA ( $p < .05$ ), and the magnitude decreases as compared to Model 1 in Table 5; that is, we observe a partial mediation of the link between 3+ women on ROA via board attendance. The main effect of 3+ women declines from 4.47 (total effect) to 3.781 (direct effect) resulting in an indirect effect of 0.689 and a mediated main effect of 15.41% (the ratio of the indirect effect of 0.689 and the total effect of 4.47). For the model where Tobin's Q is regressed on the dummies for women's boardroom representation and board attendance (Model 4, Table 6), the link between 3+ women and Tobin's Q, which was observed in Model 1, is no longer statistically significant. That is, board attendance serves as a full mediator of the link between 3+ women and Tobin's Q.

Concluding, we find strong support for Hypothesis H2 that stated that the link between postulated mediation model (women on boards—board attendance—corporate financial performance) only works when there is more than one woman in the boardroom. Interestingly, already one single woman in the boardroom is associated with a higher attendance as compared to an all-male board (Models 2 in Tables 5 and 6).

## 5 | DISCUSSION AND CONCLUSION

### 5.1 | Main finding: Board attendance mediates the women—performance link but only if there is more than one woman in the boardroom

Based on the input-process-output model by Forbes and Milliken (1999) and tokenism (Kanter, 1977), we theoretically explored how women directors link to intermediate board processes and how the latter might be reflected in board attendance, thus shedding light on the black-box around the behavioral decision-making processes in the boardroom and how these are affected by whether there is only one “token” woman in the boardroom or whether there are more women in the boardroom. Empirically, we analyzed whether the link between women directors and firm performance is mediated by board attendance, and we additionally investigated potential nonlinearities. Our main finding is that the link between women directors and firm performance is in fact (partially) mediated by board attendance but that this is only the case if there is more than one woman in the boardroom. In what follows, we discuss our results with respect to the different steps of the mediation model in light of the existing literature.

Firstly, we find a higher share of women directors to be associated with both: a better accounting-based (ROA) and a better market-based corporate financial performance (Tobin's Q). Investigating potential nonlinearities reveals that it needs—depending on the outcome measure—at least two (ROA) or even three or more women directors in the boardroom (Tobin's Q) to realize a better corporate financial performance. Finding that the link between women directors and corporate financial performance is nonlinear and that the number of women directors needs to surpass a certain threshold to positively link to performance ties in with the theoretical and empirical literature on the so-called “critical mass” (Erkut et al., 2008; Joecks et al., 2013; Kanter, 1977; Torchia, 2013). According to this literature, it needs a critical mass of at least three women in the boardroom for positive effects to materialize. It is only then that the women directors will strongly identify with the social role of a board member (Jonsdottir, 2010; Terjesen & Sealy, 2016). A further explanation for the observed nonlinearity is rendered by legitimacy theory (Suchman, 1995): When there is only one woman in the boardroom, this one woman might well have been appointed for legitimacy reasons only and not to enhance board task performance. Rather the selection process might focus on appointing someone who is at ease with the token role and who might not challenge the decisions of the management board. Appointing more than one woman to the boardroom, to the contrary, might indicate that the respective company is not merely doing so for legitimacy reasons but because it truly seeks to enhance board task performance.

That our results with respect to the size of the critical mass vary depending on whether an accounting or a market-based performance measure is used is well reflected in the literature that has repeatedly found the effects of women directors on corporate financial performance to depend on the performance measure (see Adams & Ferreira, 2009; Ahern & Dittmar, 2012; Bennouri et al., 2018; Carter

et al., 2010). Specifically, the literature has repeatedly found the effects of women directors on market-based performance measures (such as Tobin's Q) to be either positive but weaker than the ones on ROA (Carter et al., 2010) or even negative (Ahern & Dittmar, 2012; Bennouri et al., 2018). One explanation for this discrepancy between women directors' effect on accounting as opposed to market-based performance is that investors might be biased against women directors (see, e.g., Haslam et al., 2010; Niessen-Ruenzi & Ruenzi, 2019). We contribute to this recent literature on gender-biased investors by finding that, apparently, for investors to realize and acknowledge a potentially positive contribution of women directors and to subsequently adjust their assessment of the firm's financial performance, women's boardroom representation apparently needs to exceed two women directors.<sup>3</sup>

Secondly, our finding of a significant positive link between the share of women directors on the board and board attendance rates is in accordance with the result of Adams and Ferreira (2009) who find women directors to be less likely to have attendance problems and boards with more women directors to be less likely to have attendance problems. However, while Adams and Ferreira (2009) only distinguish between board attendance rates that are either above or below a 75% threshold (with the latter defining what Adams and Ferreira (2009) call an "attendance problem"), our analysis is more differentiated in that it refers to the actual attendance rate and not a certain attendance threshold. Further, our finding does not per se contradict the result of Bianco et al. (2015) who find women directors to have lower attendance rates than men directors. This is because our result that board attendance is higher when there are more women directors on the board refers to the board level and not to the individual level. By being the first to investigate the potential nonlinearities of the link between the women directors and board attendance, we further contribute to our understanding of this link. As—according to our results—already one single woman in the boardroom is associated with a higher board attendance, the link between the share of women directors and board attendance will rather be driven by women directors positively affecting the behavior of their male counterparts than by the women directors themselves.

Thirdly, we find board attendance to be positively related to subsequent corporate financial performance (accounting as well as market based) where we make sure to lag corporate financial performance to map the time structure of the attendance-performance link. While our result confirms earlier work by Brown and Caylor (2006), Chou et al. (2013), and Lin et al. (2014), we are the first to comprehensively analyze the link between board attendance and firm performance by using both, an accounting and a market-based performance measure. Moreover, we also contribute to the literature on the link between board attendance and corporate financial performance by providing an input-process-output model that suggests several intermediate processes that might explain why board attendance and corporate financial performance are positively linked: the presence and use of *knowledge & skills*, *board effort norms*, and *cognitive conflicts*.

Fourthly, we find the positive link between women directors and corporate financial performance to be mediated by board attendance. As predicted, the mediation is only partial. When we investigate potential nonlinearities, we find the link between women in the boardroom, board attendance, and corporate financial performance to be contingent on three or more women being in the boardroom. For ROA, already two women in the boardroom are associated with a better corporate financial performance, but the link is not mediated by board attendance (no link between two women in the boardroom and board attendance). Further, we find the link between three or more women directors and Tobin's Q to be fully mediated by board attendance. That our theoretical prediction on an only partial mediation is not borne out by the data when it comes to the market-based performance measure and when we use dummy variables for the exact number of women might be explained by our small data set where the positive link between women directors and market-based corporate financial performance was—in accordance with the literature—weaker from the beginning.

## 5.2 | Supplementary finding: Already one woman in the boardroom increases board attendance, but this does not translate into a better corporate financial performance

Interestingly, we find that even when there is only one "token" woman director in the boardroom, board attendance does also increase but that the higher board attendance does not translate into a better corporate financial performance. Why might this be the case?

The answer is that board attendance might rise following the appointment of a woman to a previously all-male board for reasons that are *unrelated* to an improved board performance. For instance, if men directors only appeared more often at the board meetings once a woman has been appointed to the board, for example, to show their "appreciation of the women" in the boardroom (as our male interview partner #6 puts it), the resulting higher board attendance would not necessarily translate into a better board performance.

Likewise, we would not expect any performance enhancing effect when men directors only increase their attendance because they find their board work more attractive and enjoyable now that there is "a pretty accessory" at the table. And this is *literally* how the very same interview partner describes how he thinks that the chairman of his board perceives the newly appointed women in the boardroom:

So, he is a ... 75-year-old man who appreciates and loves good food, good watches, good suits [...] Where does he stand regarding women?—Looks pretty, such a woman at the table and is a pretty accessory (Interview 6).

Referring to this category of boardroom directors who often take pride in being overly polite and gentleman-like to their female



colleagues, but who completely disregard women directors' expertise and knowledge, interview partner #15 states:

These are typically those who immediately knock a chair into the back of your knee, and who tear your coat off your shoulder, so to speak, the cavaliers of the old school, but who then acknowledge the funny ideas of Ms. ... with a smile (Interview 15).

If men directors increase their presence at the board meetings because they enjoy the sight of a “pretty accessory” at the boardroom table or because they are primarily concerned with showing their appreciation of the women and their gentleman-like manners, it does not come as a surprise that an increased board attendance does not translate into a better corporate financial performance.

With respect to our conceptual model, our supplementary finding thus hints at board attendance being in fact only a proxy for the intermediate boardroom processes in the sense that a high board attendance might be a necessary condition for the *presence and use of knowledge & skills* or *cognitive conflicts*, but it will most certainly not be a sufficient one. Simply showing up at the meetings but not actively participating in boardroom discussions will not do the job. Likewise, a high attendance rate might signal strong *board effort norms*, but the signal will most certainly not be perfect but only noisy. When there is only one token woman in the boardroom, an increased board attendance might in fact not indicate stronger board effort norms or an enhanced presence and use of knowledge and skills or cognitive conflict.

### 5.3 | Generalizability and practical implications

While our analysis is embedded in the context of the German two-tier board system, our main results may well extend to other governance structures and may hence be generalizable to other contexts. In a two-tier board system such as the German one, the supervisory board is strictly separated from the management or executive board. Its task, however, is similar to that of outside directors in one-tier board systems in that the supervisory board advises and controls the executive board (Dittmann et al., 2010). When we find women directors and board attendance in German supervisory boards to be positively linked, our result is comparable to the one by Adams and Ferreira (2009) and Boutchkova et al. (2021) who find a similar result for the one-tier system of US boards. At the same time, our finding, since it refers to the board level, does not speak against the one of Bianco et al. (2015) for Italian boards who—comparable to the German ones—advise and control the executive management in a two tier-board structure. That is, there is good reason to believe that the positive link between women directors and board attendance is not limited to German supervisory boards but may hold for other contexts as well. Likewise, when we find board attendance rate and subsequent corporate financial performance to be positively linked, we tie in with the work of Brown and Caylor (2006), Chou et al. (2013), and Lin et al. (2014), that

is, with studies that analyze very different corporate governance systems: one-tier as well as two-tier board systems. Again, there is hence good reason to believe that our results may extend to other governance structures beyond the German one. Since our results on the two separate links between women directors and board attendance on the one hand and between board attendance and subsequent corporate financial performance on the other have been found in other contexts, our findings on the complete mediation model and its boundary condition should, in principle, also extend to other institutional contexts.

On a practical level, our study has several implications. *Firstly*, we find that the link between women directors and corporate financial performance is nonlinear and that three or even more women directors are needed to observe a positive effect on corporate financial performance. Hence, firms should be cautious to not only appoint one woman to the boardroom who then might suffer from her token status but to rather make sure that at least two or even three women are appointed. *Secondly*, our analysis sheds light on the intermediate board processes that might drive the link between women directors and performance: the presence and use of knowledge & skills, strong board effort norms, and cognitive conflicts. Firms might thus try to enhance the presence and use of skills and knowledge, board effort norms, and cognitive conflicts by, for instance, thoughtfully selecting board members who have the potential to add a new expertise or perspective to the boardroom, who are known for their strong effort norms and/or who can be expected to foster constructive discussions.

### 5.4 | Limitations and future research

Our study also has limitations suggesting avenues for future research.

With respect to our qualitative interview study, our findings are limited due to several reasons. First, as our data base is rather small, our interview material only provides anecdotal evidence on board members' perceptions of board processes. Correspondingly, we have used the interview material not to test or validate our theoretical claims but rather to enrich and substantiate our conceptual model. Second, our qualitative findings might be biased due to the unspoken assumption that the interviewed board members are actually *aware* of the boardroom processes and that their experience is accessible upon reflection. Third, our qualitative evidence might be biased because the interviewed women directors might feel the need to overemphasize their or other women directors' role in meritocratic terms (Seierstad, 2016) and overly positively describe women directors' contributions to boardroom discussions and decision making. Likewise, our male interview partners might be biased by the so-called “women-are-wonderful-effect” (Eagly & Mladinic, 1994) and be more inclined to report positive experiences with women directors than negative ones. While we tried to reduce these social desirability concerns by using the so-called critical incidence technique (Flanagan, 1954) where we first ask our respondents to describe two typical work situations characteristic of their board work and then only afterwards ask them to elaborate on the role of women directors

in the specific situation described (see Table A2 in Appendix A for more details), future studies might address these potential biases more thoroughly.

Concerning next our quantitative analysis, a first limitation refers to our data being limited to large listed companies, because only for these, we have information on board attendance. As board attendance is reported on a voluntary basis, we further cannot completely exclude self-selection. Hence, future research might use data from contexts where companies are legally required to report their board attendance. Further, we have to rely on companies' correctly reporting their board attendance. While the self-reported yearly board attendance rates in our data take a broad range of values and comprise values as low as an average yearly attendance rate of 50%, self-reported measures may nonetheless be prone to biases.

Further, the generalizability of our quantitative results might be limited by the fact that our quantitative sample is relatively small. Focusing on board attendance as the mediating variable and taking account of the time structure of the attendance–performance link substantially reduce the number of cases in our quantitative empirical analysis. Also, our data do not contain any information about the different characteristics of women and men board directors regarding socio-economic background, education, or career that could be used to proxy the knowledge and skills that women directors bring to the boardroom. Extending the sample size including board members' individual characteristics or studying other institutional contexts is highly welcome. While our results should, in general, also apply to other corporate governance systems, future studies may explore whether or not board attendance acts as a mediator of the link between women directors and corporate financial performance also in one-tier systems and also whether and how these links are moderated by board and firm level variables.

A further limitation of our study is that we focus on only one variable that mediates the link between women directors and corporate financial performance: board attendance. Even though board attendance is argued to reflect several intermediate board processes, it is clear that board attendance is only a proxy for those processes and that, for instance, a high board attendance is not a sufficient condition for the presence and use of knowledge & skills or cognitive conflicts, and it may only be a noisy signal for board effort norms. Investigating additional proxies of the intermediate processes may be a fruitful next step to shed more light on the mechanisms and processes that link women directors and corporate financial performance.

Lastly, while our conceptual model implies a causal link between women directors, board attendance, and corporate financial performance, our identification strategy does not allow for causal inferences. Empirically establishing a causal link is challenging, and identifying a truly exogenous instrumental variable for gender diversity in the boardroom is challenging as well (see, e.g., Sila et al., 2016). We made a first attempt to address the endogeneity concerns by (a) examining time-lagged correlations for our tested moderated mediation links with a random effects model with time-fixed effects and by (b) including the lead of our central explanatory variables for women directors to test for strict exogeneity. To further address endogeneity

concerns, we (c) used the ITCV approach (Busenbark et al., 2019; Frank, 2000), which supported the interpretation of our results. Future research might want to further address the endogeneity issue.

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## CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest with the received grant. The Hans Böckler Foundation had no impact on study design, collection, analysis, or interpretation of the data or the writing of the manuscript.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the Hans Böckler Foundation, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of the Hans Böckler Foundation.

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## NOTES

<sup>1</sup> In our semi-structured interviews, we encouraged our interviewees to freely express their thoughts on processes that—from their perspective—are apt to affect board performance. We interviewed both, women and men directors and—representing a particularity of the German corporate governance system—we interviewed shareholder as well as employee representatives. Table A1 in Appendix A enlists and categorizes our interview partners. Basic information on our study design is provided in Table A2 in the Appendix A.

<sup>2</sup> For a robustness check, we replicate Tables 3 and 4 with variables not including ratios for our explanatory variable *women percent* and our mediator *attendance* as well as our control variable *shareholder* to address the concern that the use of ratio variables may be problematic when dependent and explanatory variables share a common component (see, e.g., Certo et al., 2018). Instead, we calculated the absolute number of women ( $M = 1.99$ ;  $SD = 1.70$ ), absolute board attendance ( $M = 11.96$ ,  $SD = 5.67$ ) and absolute number of shareholders ( $M = 7.98$ ;  $SD = 3.15$ ). The results are as follows: The link between performance and the number of women is significantly positive for ROA but not for Tobin's Q ( $b = 0.67^{**}$  for ROA and  $b = 0.09$ , n.s. for Tobin's Q). Further, we find a highly significant positive relation between the number of women and the average number of directors that attend a board meeting ( $b = 0.95^{***}$ ). However, we find no support for the link between attendance and performance ( $b = 0.10$ , ns. for ROA,  $b = 0.006$ , n.s. for Tobin's Q) and therefore no partial mediation. Hence, it is not so much the number of attendees that counts (in terms of the presence and use of knowledge and skills), but it is rather the share of attending members (in terms of reflecting board effort norms) that is important for board task performance to be affected.

<sup>3</sup> An alternative explanation for why our results for Tobin's Q might deviate from those for ROA—and we owe this interpretation to an anonymous reviewer—refers to investors being more concerned about return

on equity (ROE) rather than ROA. And, interestingly, while qualitatively robust, our results are in fact no longer significant when we use ROE as an alternative accounting-based performance measure instead of ROA. Because ROA is more comparable across firms, however, we tie in with the literature that predominantly use ROA and not ROE when analyzing the link between board composition and accounting based corporate financial performance (see Combs et al., 2005; Post & Byron, 2015).

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## APPENDIX A

TABLE A1 Interview partners.

Number	Male	Female	Shareholder representative.	Employee representative	Chairperson
#1		Yes		Yes	
#2	Yes			Yes	
#3	Yes			Yes	
#4	Yes			Yes	
#5		Yes		Yes	
#6	Yes			Yes	
#7	Yes		Yes		Yes
#8	Yes		Yes		
#9				Yes	
#10	Yes		Yes		
#11		Yes	Yes		
#12	Yes		Yes		Yes
#13		Yes	Yes		
#14		Yes	Yes		
#15		Yes	Yes		
#16		Yes	Yes		
#17		Yes		Yes	

TABLE A2 Expert interviews.

Sampling and respondents	We applied a mixed sampling design (Biernacki & Waldorf, 1981), combining (1) expert sampling where we directly contacted potential interviewees from our quantitative data base via e-mail, XING, and LinkedIn and (2) the so-called snowballing-technique (Kakabadse et al., 2015). In an attempt to limit potential biases such as sample selection bias (Griffiths et al., 1993; Kaplan et al., 1987; van Meter, 1990), over-estimation of the cohesiveness of replies (Griffiths et al., 1993), missing isolated experts (van Meter, 1990), or gatekeeper bias (Grogger et al., 1999), we systematically approached experts from industries that were under-represented in the expert recommendations. Also, we took great care to balance our sample of respondents with respect to gender and representative function.
Interview structure and guideline	We conducted semi-structured interviews based: As a warm up, we asked our interview partners to name those personal characteristics they judge to be important for a board member to have and those they judge to be irrelevant. We next applied the so-called "critical incident technique" (Flanagan, 1954), asking our respondents to depict two typical situations that they regard to be characteristic of their board work. Afterwards, we asked our interview partners to elaborate on the role of women directors in the specific situation described. Letting our interview partners first describe a situation and only then ask them about the role that women directors played in this situation has the advantage that it gives our interview partners the opportunity to describe their experience in their own words (Stauss & Weinlich, 1997), without any distortion caused by the interviewers (De Ruyter et al., 1995). While we thus first encouraged our interviewees to freely express their thoughts on how women directors (might) affect board processes, at a later stage of the interview, we also asked our interview partners to comment on a potential positive link between women directors and board attendance and on a positive link between board attendance and corporate financial performance.
Interview conduction and material	Two of the authors conducted all of the interviews. Thirteen interviews were conducted by two interviewers and four by only one. Fourteen interviews were conducted in the first half of 2015; three additional interviews (#15–#17) were conducted in the summer of 2017. Thirteen interviews were conducted face-to-face, and four were telephone interviews. All of the interviews were conducted in German, with all interviewees and interviewers being native German speakers. Sixteen interviews were tape-recorded and transcribed, and one interviewee [#14] did not give us her approval to tape-record the interview. The tape-recorded interviews lasted between 15 and 80 min and were 42 min on average. In sum, we have 584 min of interview material.
Coding and analysis	The interview transcripts were coded with ATLAS.ti. For the analysis, we applied a qualitative content analysis (see, e.g., Olson et al., 2016). Following Kuckartz (2014, p. 60f.), we used a deductive-inductive methodology, where in a first step, four raters independently and deductively coded the material, followed by a discussion of the codes in several meetings. In a second step and based on our conceptual model, two raters inductively derived additional theory-based categories and used these to supplement the deductive codes that had been identified as recurring and of interest by the raters.

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