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RESEARCH ARTICLE

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The relationship of board diversity and stock performance in monistic and dualistic board structures: Results from Germany and UK

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Abstract

The analysis of the relationship between board diversity and corporate performance is a well-documented area of research. Our analysis of the stock market in Germany and the United Kingdom (UK) from 2005 to 2018 contributes to the literature by considering different corporate constitutions (monistic and dualistic) as well as a variety of diversity factors and diversity potential factors in a uniform analytical framework. We implement the stock price performance as a company performance proxy because this can be observed more easily by non-professional investors than Tobin's Q, commonly used in former studies, and represents a pure market-based view of the company performance. Based on generalized least squares panel regressions (GLS), our results reveal no significant difference between monistic and dualistic corporate constitutions regarding a possible relationship between diversity and company performance. They support former studies that the size of a top management board is significantly negatively related to company performance in the long run. Furthermore, no significant correlation can be found between changes in a board in a fiscal year and company performance, which was analyzed for the first time in such a framework.

KEYWORDS
corporate governance and control, diversity, financial performance

JEL CLASSIFICATION
G15, G30

1 | INTRODUCTION

The assessment of the performance of work-related teams, which is carried out based on individually defined and context-related output or success variables in the sense of performance measurement, and this applies in particular to the top management, has been an important field of research in the social sciences as well as business administration for decades. This is also done to gain insights into the best possible composition of teams. In this context, the keyword diversity is significant as a possible success factor. Diversity is the heterogeneity or variety of group members

(van Dick & Stegmann, 2016). A group's diversity level can be determined based on various characteristics (e.g., demographic and psychological characteristics). However, it is important to remember that the more characteristics form the basis of the definition of diversity used, and the more differentiated these characteristics can be, the more diverse a group can be in terms of its potential (Kanning, 2016).

Diversity as a possible factor influencing corporate financial performance and the question of how to evaluate it is becoming increasingly relevant for companies and are consequently moving into the area of responsibility of the top management (diversity management; DEI = Diversity, Equity, Inclusion) on the one hand due to the strategic dimension, but on the other hand also about the composition of company top management as an institution itself. The reasons for this necessary focus on diversity management on the part of companies, on the one hand, about the entire workforce (group of people), and on the other hand, about the composition of work teams (goal- and task-specific groups within a company), are manifold: changing labor force participation of women and men; legal provisions for the equal participation of women and men in the workplace as well as of different age groups; integration of persons with a migration background and transnationally mobile experts into the labor market (Buche et al., 2013).

How the level of diversity in groups affects corporate financial performance is disputed in the literature and manifests itself fundamentally in two strands of literature: According to the heterogeneity thesis, an ideally absolute divergence of inter- and intrapersonal characteristics and attributes of group members creates the best starting position to better deal with uncertainty in entrepreneurial action and to be better prepared for uncertainty. Resource- and knowledge-based approaches to corporate governance and control can be used as a rationale here, as an increase in (different) resources, perspectives, and competencies can be advantageous for companies' dynamics, adaptability, and innovation activity. The opposite is postulated within the framework of the homogeneity thesis since a high efficiency of group performance is accompanied by a high homogeneity of group members. Accordingly, each member is replaceable, there are no misunderstandings, and there are hardly any controversies in the discussion, which leads to reduced transaction costs and increased market-oriented valuation of the company. Likewise, there are no further frictions when integrating new (homogeneous) members, reducing transaction costs (Buche et al., 2013; Hansch, 2021).

In a monistic board structure, there is a single board that combines both executive and non-executive directors. This means that the company's top management, represented by the executive directors, and oversight, represented by the non-executive directors, are integrated into a single board where both sides, operating and supervising activities, are not located in two independent boards. Executive and non-executive board members decide together. This approach is more common for Anglo-American-oriented ecosystems like in the UK and should provide fast entrepreneurial decisions; however, under a supervision character due to the non-executive members. There are two separate boards in a dualistic board structure: a management board (executive board) and a supervisory board (non-executive board). The management board is responsible for running the company's day-to-day operations, while the supervisory board's primary role is to supervise the management board's activities. The meetings of the boards are held separately. This approach is more common in continental European countries like Germany and should improve the quality and independence of supervision activities.

So far, however, the literature has yet to investigate any possible relationship between diversity in top management groups and corporate financial performance related to a comparison between monistic (one-tier system) and dualistic (two-tier system) corporate governance under the same research framework. However, this could explain the partly diverse results on the influence of diversity on corporate performance from different countries. Therefore, we contribute to the existing literature by analyzing listed companies from the blue-chip indices in Germany and the United Kingdom (UK) with a unified research framework based on an appropriate financial performance measure and selecting relevant factors as proxies for diversity from the perspective of (potential) non-professional investors. The focus on blue-chip indexed companies ensures that the highest transparency requirements are granted, and it thus appears easier for non-professional investors to obtain sociodemographic variables about the members of the top management groups in particular and financial key performance indicators. In addition, the focus on blue-chip stocks allows potential size effects to be largely diminished. Therefore, non-professional investors must readily observe the top management groups' applied performance measures and diversity characteristics with minimal effort to keep their monitoring costs as low as possible.

Since top management groups are primarily responsible for strategic decisions and their outcomes are not reflected in the short-term in financial company performance indicators, we have taken into account two different regression models in our research framework between the recorded diversity characteristics and the stock price performance as a proxy for the financial company performance from the (potential) non-professional investor perspective, each of which has a time lag of 1 or 2 years. This decoupling between the stock price performance over 1 and 2 years

as a dependent variable and the different diversity characteristics as independent variables helps to determine causality and thus avoid endogeneity problems.

Our paper provides evidence that, from a (potential) non-professional shareholder perspective, the size of the board has a negative effect on corporate performance, with no differences between monistic and dualistic corporate governance. Our results also largely confirm that the influence of diversity in top management groups on financial performance measured by stock price performance is marginal in the long run. This is also true regardless of whether the company has a monistic or dualistic corporate structure.

The paper is structured as follows: Section 2 gives the relevant information for the possible relationship between diversity factors and corporate performance and defines diversity and performance in the context of this analysis. Section 3 presents the applied data set and the methodology. Section 4 deals with the presentation of the results and their discussion. A conclusion of the results is presented in section 5.

2 | RELATED LITERATURE

Diversity is a very complex framework. To take this complexity sufficiently into account, so-called layer models have become established for describing it. In the context of diversity, these models are all based on the work of Loden and Rosner (1991) and Gardenwartz and Rowe (2003). In our paper, we also follow this layer model and distinguish between the dimensions of personality, internal dimension (e.g., age, gender), external dimension (e.g., work experience, education), and organizational dimension (e.g., place of work, field of work). In the context of this paper, the diversity characteristics of the internal (second) and external (third) dimensions are referred to as diversity factors. The characteristics of the organizational dimension interact with the diversity factors and form a framework for them. Therefore, we consider the characteristics of the organizational (fourth) dimension as diversity potential factors to distinguish them from the diversity factors better.

The term corporate governance and control addresses the totality and commonality of all persons and systems associated with the control, management, fundamental influence, and determination of a company, as well as regulations, standards, measures, and their enforcement and implementation (Oehler & Wendt, 2007; Wendt, 2011). This reference to people and the institutionalizing character of diversity potential factors is the substantive interface between diversity and corporate governance and control. It makes it understandable how diversity can influence the market-oriented valuation of companies.

The structure of corporate governance and control is primarily determined by the fundamental differentiation between internal and external corporate governance and by the differentiation of management structures and supervisory structures of capital market-oriented companies between monistic (one board with executive and non-executive members) and dualistic (executive board, supervisory board) corporate governance (Velte et al., 2014). Numerous studies have addressed whether a correlation between diversity in top management groups (board, executive board, supervisory board) and corporate performance can be proven empirically. While it is intuitively understandable why diversity in top management groups might influence financial company performance, whether the effect is positive (heterogeneity thesis) or negative (homogeneity thesis) remains largely unclear. It is therefore not surprising that the results in research on the influence of diversity itself are markedly diverse and that in many studies, relatively low influence strengths are also found and then often only in studies that can be based on readily observable socio-demographic variables from the internal dimension (Kanning, 2016).

In recent studies, the main focus has been on company performance against the background of gender and age diversity in the respective top management group, with the monistic board structure, in particular, serving as the field of investigation. Although both characteristics are relatively easy to survey, the results do not reveal a consistent direction of the effect of gender diversity and age diversity in the long term. This could be due not least to possible interaction effects between the diversity factors considered (Velte et al., 2014). The concrete role of the size of the top management group as a diversity potential factor also remains largely unclear. Earlier findings on this are also not unambiguous regarding the direction of effect, but a tendency is nevertheless noticeable. For a monistic board structure, Cheng (2008) concludes that larger boards are less efficient, and decision-making processes are delayed, resulting in additional transaction costs that reduce the company's value. He justifies his findings with the fact that in a larger top management group, coordination processes between the members take more time. Based on his data set, he also confirms Jensen's (1993) hypothesis that the larger the top management group, the greater the importance and power of the chief executive officer (CEO) in this group since it is easier for the CEO to forge "alliances" for the related business policy, while a potential opposition must first organize itself and the need for coordination increases to take coordinated action against the CEO's plans. This results in a loss of efficiency, hurting the company's key performance indicators. From studies conducted in the mid and late 1990s in the U.S. stock market on the influence of board size as a diversity

potential factor on corporate performance, Yermack (1996) and Eisenberg et al. (1998) also conclude that there is a negative relationship between board size and company performance. Conyon and Peck (1998) and Guest (2009) also show the negative relationship between board size and company performance in European markets. Fooladi (2012) shows this negative relationship for Asian stock markets as well. However, Larmou and Vafeas (2010) come to a more differentiated conclusion; they show that a positive correlation between board size and company performance can be established. They explain that in the case of smaller companies that achieved poor operating performance in earlier years, a larger number of board members can certainly increase the company's value. However, this effect is not permanent and turns into the opposite when operating performance stabilizes.

Although the diversity factor of age is well documented in principle, it is likely to become even more important in the future, prompting further research. This development is triggered by a progressive and still accelerating demographic change in societies in many developed countries. Under this impression, it is becoming increasingly difficult for companies to find suitable managers and retain them longer (Backes-Gellner & Veen, 2009). Therefore, it is reasonable to assume that the shortage of skilled employees—which in principle also includes members of top management groups—could be countered by (re)integrating older employees into the labor market to an even greater extent. However, Verhaeghen and Salthouse (1997) show in their meta-analysis of 91 studies that there is a significant negative correlation between age and the decline in cognitive ability. In particular, the reaction speed decreases strongly. There is a correlation, although not as strong as for reaction speed, for rational decision-making skills, visual-spatial imagination, and short-term and long-term memory. These abilities decrease faster, especially from the age of 50. However, also to a lesser extent, before that (Verhaeghen & Salthouse, 1997). Empirically, Waelchli and Zeller (2013) have also demonstrated this cognitive decline. Using a sample of not listed companies, the authors find a robust negative correlation between the age of the CEO and company performance. This is because an individual is generally only willing to change to a limited extent. Although this is also true at a younger age, it is still easier to overcome potential frictions and adapt. At an older age, however, this ability diminishes. There is a significant risk that the motivation cannot be mustered either. Instead, energy flows into maintaining previous knowledge and skills acquired rather than expanding them (Ackerman, 1996). The maxim is primarily to maintain the status quo (Waelchli & Zeller, 2013).

Belaounia et al. (2020) find in their analysis of the correlation between gender diversity and company performance that in countries with greater gender equality (e.g., Northern European countries), female board membership can increase overall board performance. In contrast, for countries with relatively lower gender equality, female board members are found to have no significant influence on board performance. On the other hand, Buchwald and Hottenrott (2019) conclude that companies with (more) female board members have a higher sensitivity to performance and turnover. In principle, a higher proportion of women reduces the propensity for executive turnover. Still, when the interaction with underperformance is considered, this does not indicate any correlation between financial corporate performance and gender diversity on executive boards. Joecks et al. (2013), on the other hand, show in the context of a critical mass theory that a more gender-diverse composition of boards can lead to improved corporate performance, but this requires reaching critical mass, which, according to their analysis is around 30% in boards. However, suppose the level of gender diversity is lower. In that case, increasing women's quota can lead to lower corporate performance, as resistance within the male-dominated corporate structures and corporate hierarchies can lead to friction losses and trigger transaction costs. Interestingly, this critical mass of 30 % is also frequently found in legal initiatives to implement women's quotas. Fernández-Méndez and Pathan (2023) show in their analysis about the potential effect of gender quotas for European stock markets that companies in countries with flexible existing regulations on board gender diversity and companies with a larger gap between current levels of board gender diversity and about 33% gender quota (or 40% female as non-executive board members) by European Union (EU) regulation tend to have positive valuation effect at the market (Fernández-Méndez & Pathan, 2023). In the analysis in Denmark, Rose (2007) could not establish any connection between gender diversity in management bodies and corporate performance in the financial sector. However, the Northern European countries are precisely supposed to be predestined for this, as Belaounia et al. (2020) show. It is, therefore, reasonable to suspect that diversity in the methodological approach also leads to different results.

Gender and age are often examined as diversity factors in economic literature. This is because these are relatively easy to collect data, and in terms of theory, an influence on performance is quite causally plausible. It is clear that in the case of a further study about the relationship between company performance and diversity in top management teams, these two factors are incremental for additional research due to comparison reasons. However, as a representative of the diversification potential factors, only the size of the top management group is often analyzed. This information can also be easily collected, and explanatory content appears intuitively comprehensible. About the

measurement of company performance, only a low level of diversity is discernible across existing research. Most studies use Tobin's Q (market value-to-book value ratio) and its derivatives as a proxy for firm performance or return on equity (RoE). However, the use of Tobin's Q does have disadvantages since not all investments in intangible assets, for example, are taken into account, and thus not all strategic resources of a company, which are; however, precisely controlled by the company management, can be recorded (Villalonga, 2004; Yermack, 1996). A pure market-oriented analysis, which is carried out, particularly from the perspective of (potential) non-professional shareholders, is currently missing from the literature.

3 | DATA AND METHODOLOGY

Our work initially draws on the known and established diversity (potential) factors from existing research but expands the framework in some aspects. First, an attempt is made to apply the same framework to both a monistic and dualistic corporate governance system in financial markets to draw any comparisons in the results between them. For this purpose, German- and UK-listed companies are used as objects of investigation from the respective national blue chips indices with the top management groups executive board and supervisory board (dualistic corporate constitution, two-tier system) as well as the board consisting of executive and non-executive members (monistic corporate constitution, one-tier system). Furthermore, additional variables are included in a generalized least squares panel regression model (GLS). These include, for example, a dummy variable that reflects whether there has been a change in the respective top management group in the individual fiscal year, as it is assumed that a change in a top management group could result in disruptions and initial friction losses with the new member. This dummy variable supplements the top management group's otherwise usual diversity potential factor size. For the diversity factors, in addition to the average age in the management body, the spread of age measured by the standard deviation in the respective management body in the financial year is also considered.[1] The measure of stock returns over a certain period is deliberately used as a proxy for a company's financial performance. This is intended to focus the analysis perspective on the non-professional investor's perspective and the related shareholder value as a speculative rather than a buy-and-hold investor. Moreover, in contrast to determining Tobin's Q, this information is much easier to collect and process for any type of investor, whether professional or non-professional. In addition, several periods are used to assess company performance based on stock price development and thus the pure market-oriented valuation of the company since it is assumed that the decisions made in management bodies of companies are strongly of a strategic (long-term) nature. Therefore, it can be assumed that the decision-making in a top management group and the possible visibility of the stock returns will likely be significantly delayed (time lag). Therefore, 1 and 2 years after the fiscal year are used as performance periods for assessment. Based on our analytical framework, we avoid from the outset possible bias problems in the estimation of the regressions that could arise from the endogeneity problem often cited in the empirical literature[2] since we have a clear causality through a temporal sequence in the dependent variable (t_0) and the independent variables (t_{-1} or t_{-2}). This leads to an exogeneity of the independent variables in our models.

In order to be able to empirically analyze the relationship between the diversity factors age and gender as well as the diversity potential factor size of the top management groups, all companies listed in the Dax, MDax, SDax, and TecDax in Germany as of June 30, 2017 (160 companies), as well as all British companies listed in the FTSE 100 (100 companies), were taken into account in the analysis. The focus on blue-chip stocks allows potential size effects to be largely diminished.[3] The observation period extends from 2005 to 2016, with the 2-year stock performance assessment downstream to 2018. If companies were only included in one of the indices mentioned above in the years following 2005 during the period under review, they were only included in the data sample from this period onwards. The same applies in cases where companies were delisted from the stock exchange or due to mergers. They were still considered with the last listing and dropped out of the used data set. However, this survivorship bias problem is the exception and does not significantly affect the data set's structure.

The number of executive board members, supervisory board members (Germany), and board members (UK) within a company's fiscal year was taken in the first step from the respective annual reports, which were retrieved manually from the companies' websites. These were also available in all cases at the first survey date in the summer of 2018 back to 2005, provided the company was already listed on the stock exchange in 2005. Based on the available annual reports of the companies within the observation period, the number of members in the respective top management groups was identified for each fiscal year; the names, the year of birth, and the gender of the members were recorded as far as possible and, if it was not possible to conclude the age of the respective member of the top management group, a search for the person concerned was undertaken in the Refinitiv Eikon (formerly Thomson Reuters) database in the ESG section. After searching

this database, 20% of the persons considered needed information about their age. This proportion needs to be smaller to close these gaps validly with the help of missing value approaches, mainly since the missing values were found cumulatively, particularly for German companies. However, to avoid the exclusion of too many data points, extensive manual research was initiated to close any gaps in the age data. The procedure was as follows. The person's name and associated company were entered into the Google search engine. The three most common sources of age data were: (1) the company's official website with a detailed listing of the board of directors and supervisory board members (including curricula vitae). (2) databases such as www.bloomberg.com and www.marketscreener.com. (3) in the case of FTSE companies, the official records of the companies and their board members in the UK Companies House (beta.companieshouse.gov.uk). A more targeted Google query was used if the three options mentioned above did not produce any results. By adding the words "jährige", "Alter", "geboren" (for British companies, "age", "old", "born"), online newspaper articles, archive entries, old press releases, and interviews could often be found, from which the respective age of the person in question could be derived in most cases and was also assumed to be correct. Not knowing the age of an individual board member strongly impacts the dataset because it does not allow the average age and the spread of age within the board to be consistently determined. If it was impossible to determine the age of a member of the top management group, despite extensive manual post-recording, the company was removed from the data set for the period in question where this person had been a member of the respective top management group.

The price data for determining the 1- and 2-year stock returns were taken from the CRSP database on a monthly basis and adjusted for dividends and any share splits and reverse splits. The monthly continuous returns were cumulated to determine the 1- and 2-year stock returns. Subsequently, they converted back into discrete returns for better interpretation ($CR_{i,T}$ = cumulative return of share i over the observation period T, where T = 1, 2, …). In the case of fiscal years that follow the calendar year, performance was observed from 01.01. of the following year until 31.12. of the following year, with the close of the fiscal year on 31.12. or, in the case of the 2-year observation, until 31.12. of the year after next. For companies with a fiscal year that does not follow the calendar year (around 35% of the companies included in the whole data set), the $CR_{i,T}$ was determined on a company-specific basis, depending on the end of the fiscal year. An industry analysis as a robustness check, based on the GIC classification, was dispensed with due to the focus on blue chips in Germany and the UK and the fact that some industries would then have been too sparsely populated for an evaluation. Table 1 presents the considered independent variables for the regressions:

The panel GLS regression follows the following formal representation and is the same for the studies on the German and the British stock market; only the number of independent variables taken into account varies between the two different regions:

$$\widetilde{Y_{i,t}} = \alpha + \beta_1 x_{i,t-1,2} + \cdots + \beta_k x_{i,t-1,2} + \tilde{\mu}_i + \tilde{\varepsilon}_i$$

The Hausman Test indicates a panel regression with random effects as the best solution; therefore, the panel is unbalanced, and GLS and not OLS were applied. Heteroskedasticity and multicollinearity were controlled with no significant negative results for the analysis.

Despite modifications to the analysis setting compared to previous studies, it is not fundamentally assumed that the results will contradict previous findings. Instead, the analysis conducted here is seen as a robustness test to the existing literature, as the theory-based causalities between diversity and company performance are already well documented. It is to be expected that in our study, too, the size of a top management group as a diversity potential factor will have a negative influence on company performance measured by stock returns over one and 2 years and that diversification factors such as gender diversity or age diversity will not bring about any systematic correlations or explanatory content to the stock performance. It is also assumed that there are no differences in our results between monistic and dualistic corporate governance.

4 | RESULTS AND DISCUSSION

Table 2 shows the descriptive analyses of the German data set over the observation period 2005 to 2016 on the variables *number* (members in the executive or supervisory board), *women's quota* (proportion of female members in the total number of board members), *average age* (average of the age of the board members) and *dispersion age* (average deviation from the average of the age of the board members measured with the help of the standard deviation). The size of both data sets reaches its maximum in the last year of the study. The average number of board members hardly varies in the case of the executive board and only very slightly in the case of the supervisory board. The proportion of women on the executive board rose from 1.4% in 2005 to 5.6% in 2016, while the proportion of women on the supervisory board in Germany is significantly higher over the years of the study but never reached the 25% threshold or the 30% proportion required by the

TABLE 1 Variables in the panel GLS regressions for Germany and UK.

Independent variables panel GLS	
Monistic Corporate Constitution (UK)	**Dualistic Corporate Constitution (Germany)**
number (members in the board)	*number* (members in the executive or supervisory board)
women's quota board **(share of female members in the total number of board members)**	***women's quota*** **(proportion of female members in the total number of board members)**
women's quota executive (share of female members in the number of executive members on the board)	*average age* (average of the age of the board members)
women's quota non-executives **(share of female members in the number of non executive members on the Board)**	***dispersion age*** **(average deviation from the average of the age of the board members measured with the help of the standard deviation)**
average age (average of the age of the Board members)	*dummy change board* (did take place a change in the board?)
dispersion age **(measured by the standard deviation from the average of the age of the Board members)**	
dummy change board (did take place a change in the board?)	
dummy change non-executives **(did take place a change among non executive members?)**	
dummy change executives (did take place a change among executive members?)	

Note: The table presents the considered independent variables depending on whether the corporate constitution is monistic (UK) or dualistic (Germany).

critical mass theory. The average age in the executive and supervisory boards fluctuates slightly over time if there is a slight tendency towards older executive or supervisory board members. The spread of the average age on the supervisory board hardly varies; small fluctuations can be seen over time in the case of the executive board. However, these are only evident in a comparison from the beginning to the end of the observation period. If one follows the reasoning of Verhaeghen and Salthouse (1997), then, on average, a decrease in cognitive abilities should have been expected among the members of the top management groups. However, this cannot be empirically verified based on the collected data.

Table 3 shows the panel regressions results for German companies' executive boards from 2005 to 2018. Both models have extremely low explanatory power (.0109 and .0139). This is also consistent with the statement by Kanning (2016, 21–23). Model 1 considers a stock return 1 year after the respective business year under consideration (t−1), whereas Model 2 considers a 2-year performance period (t−2). There are no significant differences between the results of the two models. In both models, however, significant evidence exists that the number of board members develops negatively with the stock returns. The other independent variables considered do not provide significant explanatory power for stock returns as a proxy for the pure market value-oriented valuation of companies from a non-professional investor's perspective. The negative correlation between the number of board members and performance is mainly consistent with the previous literature. However, it should not be concluded from these results that the optimal size of a board should be a maximum of one person in an extreme case. It can be assumed that there is a critical size downwards in the executive board size that must not be fallen short of to keep a company capable of acting. However, this necessary size should be very company-specific and does not allow for any generalizations, especially since the respective company's degree of internationalization and diversification certainly plays a role here. However, the results indicate that this critical size is exceeded towards the bottom and that an extensive board is associated with efficiency losses, which are negatively reflected in the stock returns in the future. The newly added variable change in the board of directors provides no new insights. It can be assumed that changes in the executive board are usually (e.g., change in the board due to retirement) planned well in advance and well prepared so that no negative effects on the

TABLE 2 Descriptives of the executive and supervisory board of listed companies in Germany.

Executive board						Supervisory board				
Year	*N*	Number	Women's quota	Average age	Dispersion age	*N*	Number	Women's quota	Average age	Dispersion age
2005	92	5	1,4	48	7	95	13	7,8	55	9
2006	99	5	1,6	48	6	101	13	7,8	54	9
2007	108	5	1,5	48	6	109	13	7,1	55	9
2008	114	5	1,8	48	5	110	13	8,1	55	9
2009	114	5	2,0	49	5	111	12	7,9	56	9
2010	116	5	2,3	50	5	113	12	8,8	56	9
2011	116	5	2,7	50	5	115	12	10,3	56	9
2012	120	5	4,2	51	5	116	12	13,1	56	9
2013	124	5	5,0	51	5	122	13	14,8	56	9
2014	129	5	5,2	51	5	126	12	15,9	56	9
2015	132	5	4,8	51	5	134	12	18,7	56	9
2016	139	5	5,6	52	5	141	12	22,1	57	9

Note: The table shows the descriptives of the data sets for the executive board and supervisory board of listed companies in Germany over the period under review. *N* stands for the number of companies for which all information is available in the business year under consideration. In the case of the variable average age and in the case of the dispersion age (by the standard deviation), these are rounded numbers. The variable women's quota is given as a percentage.

TABLE 3 Relationship between company performance and selected diversity (potential) factors | Executive Board | Germany.

	Model 1				Model 2			
	Coeff.	Robust Std. Err.	*z*	$p > \|z\|$	Coeff.	Robust Std. Err.	*z*	$p > \|z\|$
_cons	.3072174***	.1286678	2.39	.017	.5124212**	.2372456	2.16	.031
Number	−.018158***	.0054355	−3.34	.001	−.0344355***	.2542938	−2.75	.006
Women's quota	.1116429	.1270572	.88	.380	.2329546	.2542938	.92	.360
Average age	−.0018164	.0024595	−.74	.460	−.0022625	.0048564	−.47	.641
Dispersion age	−.00817	.003717	−.22	.826	−.0015159	.0080929	−.19	.851
Dummy change board	.0326498	.0269899	1.21	.226	.0299155	.0410753	.73	.466
R2	.0109				.0139			

Note: This table presents the regression coefficients (Coeff.), the robust error terms (Robust Std. Err.), t-statistics (*z*), *p*-values ($p > |z|$), and the R2 for the GLS panel regression analysis with the stock price return over 1 year after the fiscal year under consideration (Model 1) and over 2 years after the fiscal year under consideration (Model 2) for the German Executive Board. The left column shows the independent variables and the constant (_cons). Furthermore, $^{*}p < .10$, $^{**}p < .05$, $^{***}p < .01$ are applied.

cooperation within the board are to be expected when the change is carried out, which could lead to negative stock reactions in the future. The results can also be interpreted that economically, there is nothing to be said against a legally anchored gender quota but nothing in favor of it. Suppose one looks at the R2 in both models. In that case, the diversity factors considered and frequently discussed in the literature as factors relevant to valuation should be critically questioned for a pure market-oriented valuation of companies, at least at the board level.

Table 4 shows the panel regression results for the supervisory board of German companies from 2005 to 2018. Overall, both models have only extremely low explanatory power (.0101 and .0157) and are thus in the range that also emerged in the context of the executive board. However, it is noticeable that the significant negative correlation between the size of the supervisory board and company performance is significantly higher in Model 2. A direct explanation for this cannot be derived from corporate governance and control theories. However, the argumentation that has already been made concerning the minimum size of the executive board can also be used here, that is, the ideal size, apart from legal framework conditions, cannot be only one member. Here, too, it can be assumed that a critical size of the supervisory board is necessary to fully perform its supervisory and advisory tasks for the company's benefit. The other results from the panel regression models are not surprising. They align with the existing

TABLE 4 Relationship between company performance and selected diversity (potential) factors | Supervisory Board | Germany.

	Model 1				Model 2			
	Coeff.	Robust Std. Err.	*z*	*p* > |z|	Coeff.	Robust Std. Err.	*z*	*p* > |z|
_cons	.31177948**	.1465663	2.13	.033	.2214363	.3504784	.63	.528
Number	−.0076039***	.0017726	−4.29	.000	−.0158132***	.0048182	−3.28	.001
Women's quota	.0715072	.0973448	.73	.463	−.3764255	.2498967	−1.51	.132
Average age	−.0016752	.0024932	−.67	.502	.0048937	.0075119	.65	.515
Dispersion age	.0016807	.0034335	.49	.624	.0042352	.0076484	.55	.580
Dummy change board	−.0012087	.0271193	−.04	.964	−.046412	.0666196	−.70	.486
R2	.0101				.0157			

Note: This table presents the regression coefficients (Coeff.), the robust error terms (Robust Std. Err.), t-statistics (*z*), *p*-values (*p* ***> |z|), and the R2 for the GLS panel regression analysis with the stock price return over 1 year after the fiscal year under consideration (Model 1) and over 2 years after the fiscal year under consideration (Model 2) for the German Supervisory Board. The left column shows the independent variables and the constant (_cons). Furthermore, *$p < .10$, **$p < .05$, ***$p < .01$ are applied.

TABLE 5 Descriptives of board of listed companies in the UK.

	Board						
	N	Number	Women's quota (board)	Women's quota (board executive members)	Women's quota (board non-executive members)	Average age	Dispersion age
2005	63	12	8,1	5,5	9,6	52	8
2006	69	12	9,1	4,3	11,5	53	8
2007	72	12	11,0	5,8	12,9	53	8
2008	75	12	10,6	5,8	13,2	53	8
2009	75	12	10,8	6,2	13,4	54	7
2010	75	12	11,9	6,9	14,4	55	7
2011	76	12	13,2	7,3	16,1	55	7
2012	77	12	16,5	7,7	20,2	56	7
2013	80	12	18,2	8,2	22,3	56	7
2014	80	12	21,0	9,1	25,4	57	7
2015	80	12	22,6	8,8	27,1	57	7
2016	80	12	24,2	10,7	28,5	58	7

Note: The table shows the descriptives of the data sets for the board of listed companies in the UK over the period under review. *N* stands for the number of companies for which all information is available in the business year under consideration. In the case of the variable average age and in the case of the dispersion age (by the standard deviation), these are rounded numbers. The variables women's quota (Board, Board Executive Members, and Board Non-executive Members) are given as a percentage.

literature and correspond to the results from the analysis of the board of directors. Once again, the results obtained can also be interpreted about the supervisory board in such a way that, from an economic point of view, there is no argumentation against more diversity in connection with age and gender. Still, something like this should not be at the expense of the size of the board concerning the number of members.

Table 5 presents the descriptive analysis of the UK data set over the years 2005 to 2018 on the variables number (members on the board), female quota board complete (share of female members in the total number of board members), female quota executive (percentage of female members in the number of executive members on the board), female quota non-executive (share of female members in the number of non-executive members on the board), average age (average of the age of the board members) and dispersion age (measured by the standard deviation from the average of the age of the board members). The data set reached its maximum in the 2013 study and thus showed a 20% loss of considered initial companies. The number of board members is constant on average. The proportion of women on the board is around 25 %, rising steadily throughout the observation period. Among the non-executive members, however, it is more than twice as high as among the executive members. The

TABLE 6 Relationship between company performance and selected diversity (potential) factors | Board | UK.

	Model 1				Model 2			
	Coef.	Robust Std. Err.	z	$p > \|z\|$	Coef.	Robust Std. Err.	z	$p > \|z\|$
_cons	.3012384	.278648	1.08	.28	.8696785	.5907538	1.47	.141
Number	−.0153041***	.004231	−3.62	.000	−.0329934***	.0098039	−3.37	.001
Women's quota (board)	−.0596254**	.2688101	−2.08	.037	−.140853*	.646782	−1.76	.078
Women's quota (board executive members)	.1343562	.1057166	1.27	.204	.2426654	.2922941	.83	.406
Women's quota (board non-executive members)	.2702945	.1943633	1.39	.164	.4306335	.4731188	.91	.363
Average age	.0010223	.0047301	.22	.829	−.0025207	.0097161	−.26	.795
Dispersion age	−.0045371	.0094262	−.48	.630	−.0097244	.0208499	−.47	.641
Dummy change board	−.0259882	.0574407	−.45	.651	−.1022942	.0907627	−1.13	.260
Dummy change non-executives	.0009974	.0465536	.02	.983	.0433208	.0729724	.59	.553
Dummy change executives	.0130738	.0360287	.36	.717	.0568434	.0593429	.96	.338
R2	.0160				.0333			

Note: This table presents the regression coefficients (Coeff.), robust error terms (Robust Std. Err.), t-statistics (z), *p*-values ($p > |z|$) as well as the R2 for the GLS panel regression analysis with the stock price return over 1 year after the fiscal year under consideration (Model 1) and over 2 years after the financial year under consideration (Model 2) for UK (Board). The left column shows the independent variables and the constant (_cons). Furthermore, $^{*}p < .10$, $^{**}p < .05$, $^{***}p < .01$ are applied.

average age on the board varies little at the beginning of the observation period, but toward the end, it rises on average to 58 years in 2016, from 52 years in 2013. The spread of the average age of the board members varies little and is 7 years at the beginning and then rises to 8 years in the middle of the observation period.

Table 6 shows the panel regression results for the board of UK companies. Overall, both models show only extremely low explanatory power (.0160 and .0333) but are somewhat stronger than was the case for the German top management groups. Model 1 considers a stock return annually after the respective fiscal year for the British analysis setting, whereas Model 2 assumes a 2-year performance analysis. In addition to the negative correlation between the size of the top management group and company performance, which is also evident in the British monistic corporate governance system, the negative correlation between the proportion of women (i.e., gender diversity) and company performance is surprising here. Although the negative correlation is not highly significant, its level of influence is certainly perceptible. We assume that the public opinion on gender quotas in the UK and changes in the legal framework have caused negative persistence effects in existing board structures and ultimately led to a loss of effectiveness and efficiency in decision-making processes, which had a negative impact on stock returns in the future. Interestingly, the negative influence of board size is also stronger in the British framework, which could be because boards are generally larger than the size of the top management groups in Germany. As a result, the size of the boards tends not to be a transaction-cost-saving size, and the problem of a board that is too large is much more virulent than in Germany. A need for coordination is higher if there are also more members on the board on average. It should also be noted that, conversely, it should not be assumed that the best stock return in the future will be achieved with a board with only one member. Paying attention to a critical size that enables the company's complexity to be managed effectively and efficiently without triggering unnecessary transaction costs is always important. The newly added variable change in the board does not provide any additional insight for the executive or the non-executive group. The results obtained can also be interpreted for the UK to the effect that economically, there is nothing to be said against a gender quota. However, it is also apparent that the diversity factors considered do not positively affect corporate success; only individual diversity potential factors do.

5 | CONCLUSION

This analysis follows the numerous existing research findings on a possible relationship between diversity (potential) factors and company financial performance. Our study of blue-chip stocks in Germany and the UK, spanning 2005–2018, contributes to the existing literature by incorporating diverse corporate board structures (monistic and dualistic) and a range of diversity-related characteristics within a unified analytical framework from a non-professional investors' perspective. The results based on the random effects GLS panel regression model over the period 2005–2018 show that both for the German top management groups (executive board and supervisory board) and for the board structure prevailing in the UK as an expression of the prevailing monistic corporate constitution, the size of the respective top management group appears to have a significantly negative influence on the stock returns in the future and thus on the pure market value-oriented valuation of the company and can therefore have a negative effect on average for the non-professional investors assumed here in the analysis over an investment period of up to 2 years. The slightly significant negative impact of a higher proportion of women in the case of British companies on average should not be overestimated due to the rather lumbering research design and the consideration of only one performance proxy. Still, they can, at best, be seen as an indication that, compared to the results on the top management groups in German companies, a possible negative correlation could exist due to a monistic corporate management structure. However, causality does not seem obvious here, and this model's explanatory content is also low overall. Conversely, based on the results obtained, there does not appear to be a negative influence of the average age in a management body on company performance for German or British-listed companies; this also applies to the variable of average dispersion of age in a top management group.

Although the analysis has considered the political and legal initiatives to introduce a quota for women in top management groups at listed companies (at least in Germany), these initiatives are unlikely to have significantly influenced the results. However, based on the descriptive analysis, it is recognizable that with the announcement of the legal tightening in this area with the enactment of the first corresponding law 2015 in Germany, the proportion of women in top management groups in German listed companies has already increased slightly in advance. Whether this is a coincidence or whether some companies wanted to anticipate the introduction of legislation to be able to communicate this better to the public remains unclear, primarily since, when looking at the British figures, the participation of women in boards both as executive and non-executive members also increased significantly during this period without the announcement of corresponding legislation.

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DATA AVAILABILITY STATEMENT

The data supporting this study's findings are available from the corresponding author upon reasonable request.

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ENDNOTES

[1] Talavera et al. (2018) suggest the ratio of the standard deviation of board age to mean of board age as a measure for board age diversity. In our analysis of blue chips in the UK and Germany we do not have young boards on average where the additional harmonizing is necessary. Furthermore, they explain that the differences between different common measurements of age diversity are statistically not particularly relevant.

[2] For the relevance of the problem of endogeneity of independent variables in empirical studies, see Roberts and Whited (2013), Adams (2017), Ketokivi and McIntosh (2017), and Maydeu-Olivares et al. (2020).

[3] To avoid possible size effects as far as possible, we formed quartiles for British and German companies based on the market capitalization in free float and randomly checked the correlations between returns and company size over the observation period, whereby no statistically significant correlations were found.

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