

“Earnings quality and gender diversity on German supervisory boards: an empirical analysis”

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SECTION 1. Macroeconomic processes and regional economies management

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Earnings quality and gender diversity on German supervisory boards: an empirical analysis

Abstract

Since less than 20 percent of the seats on corporate boards in Germany are held by women, the German parliament passed a law recently that requires listed companies with employee representation on their supervisory boards to give 30 percent of the seats to women beginning in 2016. Based on findings in prior research on gender-based differences in a variety of decisions settings and the expansion of skills, experiences and perspectives by gender diversity, the authors hypothesize that firms with gender diversified boards will have higher quality of financial reporting. The empirical analysis covers the financial statements of 64 companies that were listed in DAX30, MDAX and SDAX from 2006 to 2011. In the analysis, two ex-post measures of earnings quality, the performance-matched discretionary accruals introduced by Kothari et al. (2005) and the modified Dechow/Dichev (2002) model as suggested in McNichols (2002), and two ex-ante measures of earnings management, Big4 auditor and financial leverage, are applied. The study shows that companies with gender diversified boards have lower absolute discretionary accruals. Additionally, the results indicate that firms with female head or deputy head of the supervisory board are following more conservative financial reporting rules and standards. Furthermore it can be shown, that the degree of external monitoring, measured by financial leverage, is higher for firms with female supervisory members. These findings suggest that the number and position of women at board-level have important implications for the quality of financial reporting.

Keywords: gender diversity, earnings quality, discretionary accruals, board of directors, two-tier-system, women.

JEL Classification: C23, G34, M41.

Introduction

Financial reporting quality refers to the degree to which financial information reflects the underlying economic conditions of a firm (Krishnan, Parsons, 2007). By altering financial reports, managers reduce their usefulness and influence the allocation of resources by stakeholders (Healy, Wahlen, 1999). To constrain such a behavior, the German legislature has assigned the supervisory board with the monitoring of the management board (§111, German Stock Corporation Act, GSCA). The efficiency of the supervisory board in surveying the management is influenced by various characteristics, such as size, composition and activity of the body. In addition, the characteristics and experiences of the people involved, their interactions and the processes within the group play a major role. In this context, the gender diversity of the board members attracts growing attention. As a result, the German parliament has yielded to pressure of the public and passed a law on the equal participation of women and men in leadership positions in the private and public sector on 24th of April, 2015 (Federal Law Gazette, 2015). The aim of increasing the proportion of women on the boards is the professionalization of corporate management. By improving the quality of management and supervision,

stakeholder's confidence in the corporate governance should be promoted (Velte et al., 2014). Against the background of these developments, this paper addresses the following research question:

Does gender diversity on the supervisory boards of German companies influence the quality of reported financial information?

While fostering female representation in top-management positions for ethical and social reasons is undeniable, empirical findings on earnings quality are ambiguous: Some studies find a positive link between the percentage of women in top-management positions and the quality of financial information (Krishnan, Parsons, 2008; Barua et al., 2010; Peni, Vähämaa, 2010; Thiruvadi, Huang, 2011; Vähämaa, 2014; Liu et al., 2015), while other researchers find no link (Ye et al., 2010; Sun et al., 2011). The majority of these papers are based on the Anglo-American system of corporate governance. Since the German corporate governance system differs significantly from its Anglo-American counterpart, these results aren't directly transferable to the German system. This paper contributes to the literature by examining the link between gender diversity on the supervisory board of German companies and earnings quality.

The remainder of the paper is structured as follows: At the beginning of Section 1, the role of the supervisory board in the German two-tier system is explained. Thereafter, a review of empirical

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research results with regard to the influence of gender diversity in the boardroom on the quality of financial information and the derived hypotheses are represented. In Section 2 the research design as well as the data and variables used are discussed. The descriptive statistics and the empirical results are subsequently reported in Section 3. The main results and conclusions are summarized in Section 4.

1. Background and literature review

1.1. The role of the supervisory board in the German corporate governance system. Due to the small number of listed companies, concentrated share ownership and a comparably low level of takeover activity the German system of corporate governance is often termed an insider or network system, as opposed to the open and market-based Anglo-American system. Together with a bunch of other distinct features, the German corporate governance system significantly differs from the Anglo-American model. One of the main differences between the setup of the German system and its Anglo-American counterpart is the organizational and personnel separation of management and supervision in German stock corporations. Due to this separation, publicly held companies have two administrative bodies: a management board, which is responsible for running the firm under its own responsibility (§76, GSCA) and a supervisory board, which has monitoring duties, sets the remuneration of the management board, appoints its members and is involved in decisions of fundamental importance to the company (§§84, 87, 111, GSCA). The management board consists of inside directors, while the supervisory board is made up of outside directors, which are elected by the shareholders at the general meeting (§101, GSCA). The monitoring function of the supervisory board includes the auditing of financial statements, management reports and proposals for appropriation of net profit for the year (§171, GSCA). The responsibility of this board is further expanded by the German Corporate Governance Code (GCGC) to an advisory function, which requires that the supervisory board raises objections to the financial reporting, if the interests of the company or the shareholder are threatened. The size of the supervisory board varies between 3 and 21 seats, depending on the number of employees and the statutory equity (§95, GSCA). The composition of the supervisory board also depends on the number of employees and the industry affiliation of the company and varies between no mandatory employee representation, one-third representation and one-half representation (§96 para. 1 GSCA in conjunction with §4 One-third Participation Act and §7 Co-Determination Act). Besides the codetermination, the representation of bank employees on the supervisory

board is another distinct feature of the German corporate governance system. Moreover, since April 2015, it has also been regulated by law, that for listed companies that are applying the Co-Determination Act, the European Coal and Steel Co-determination Act or the Co-Determination Amendment Act, the supervisory board is composed of at least 30 percent of women and at least 30 percent of men beginning 2016 (§96 para 2. GSCA). Thereby, Germany is following the example of other European countries, such as Norway, Spain and France, and has yielded to pressure of the public.

1.2. Review of the empirical research on gender diversity in top-management and earnings quality.

Diversity can be defined as a “characteristic of social grouping that reflects the degree to which objective or subjective differences exist between group members” (Van Knippenberg, Schippers, 2007, p. 516). These differences can be classified into cognitive and demographic characteristics. As the former ones are difficult to measure for outsiders, empirical research typically focuses on demographic characteristics, such as gender, age, ethnic affiliation, educational level and professional experience as explanatory variables. Especially the effects of gender in institutional settings are examined in numerous papers with controversial results. While some of these papers find gender diversified groups to exhibit increased conflicts, low cohesion (Milliken, Martines, 1996) and decreased performance (Adams, Ferreira, 2009; Bøhren, Strøm, 2010), other studies find positive effects of boardroom gender diversity on firm performance (Torchia et al., 2011; Nielsen, Huse, 2010; Brammer et al., 2007). Compared to all-male boards, gender diversity contributes to a wider range of skills, perspectives and experiences in the boardroom (Anderson et al., 2011; Srinidhi et al., 2011). As it prevents the exclusion of a major part of human capital, diversity may improve the competence profile of a firm (Rose, 2007) and increase the quality of decision-making by providing additional resources (Oehmichen et al., 2010). Compared to all-male boards gender diversity might enhance the transparency at the board level (Srinidhi et al., 2011). Moreover, gender diverse boards demand greater accountability for managers’ performance (Adams, Ferreira, 2009). In this vein, Erhardt et al. (2003) and Bilimoria (2000) came to the conclusion that work group gender diversity promotes innovation, facilitates creativity and generates more productive discourse. Other studies identified gender-based differences in diligence, conservatism and risk tolerance (Ittonen et al., 2013; Croson, Gneezy, 2009; Barber, Odean, 2001). Prior research also implies, that women are less likely to engage in unethical behavior to gain financial rewards in the business contexts (Krishnan, Parsons, 2008). Besides differences in their leading styles and decision-making, female directors

obtain information that contributes to the reduction of asymmetric information easier than male directors (Eagly, Johnson, 1990; Powell, Ansic, 1997; Byrnes et al., 1999; Trinidad, Normore, 2005; Gul et al., 2007). Furthermore, women are found to be less tolerant towards opportunistic behavior than men (Bernardi, Arnold, 1997; Thorne et al., 2003; Krishnan, Parsons, 2008). By reducing the extent of opportunistic behavior, female supervisory board members might influence the quality of earnings. Based on these considerations, a strengthening of corporate governance is expected (Hambrick et al., 2008; Hillmann et al., 2008; Terjesen et al., 2009). In this respect, hypothesis 1 (H1) is formulated:

H1: Gender diversity on the supervisory boards of German companies influences the quality of earnings.

This hypothesis is supported by several empirical studies. Regarding the effects of gender diversified boards on earnings quality, Gul et al. (2007) find that earnings quality is higher for U.S. firms with female directors or higher proportion of women in the boardroom. Furthermore, the results of Srinidhi et al. (2011) imply that increasing the proportion of women on the board of U.S. firms might improve a firm's discipline towards reporting and could even strengthen the confidence of investors in financial statements. Using a sample of Israeli high-technology firms listed in the U.S., Gaviious et al. (2012) show that accounting aggressiveness is affected by the proportion of women on the board of directors indicating a positive link between the presence of female directors and earnings quality. In a UK context, Arun et al. (2015) find that companies with a higher number of female directors are adopting restrained earnings management practices and are therefore reporting a higher quality of earnings. By contrast, Hili, Affes (2012) could not attribute the enhancement of earnings persistence to gender diversity in the boardroom of French firms. The authors attribute this result to socio-psychological factors and the visibility of barriers that might hinder

the hierarchical ascension of female directors. The so-called glass-ceiling phenomenon is connected with stereotypes and bias against women. Nekhili, Gatfaoui (2013) expand this concept and demonstrate that women in France face a double glass-ceiling problem: Once they reach board-level, some senior positions are not easily accessible to women. Women in the boardroom might be seen as a symbol or a token which perceives limited influence regarding group decisions and faces discrimination. Therefore, besides the number of women on the board, the positions of the women in the group might be important for their influence on group decisions. The most influential positions in the boardroom are the head and deputy head of the committee. Thus, based on the behavioral differences between men and women, hypothesis 2 (H2) is posited:

H2: Firms with chairwomen or deputy chairwomen of the supervisory boards are associated with less aggressive accounting.

2. Data and method

2.1. Data. The initial sample covers all corporations being constantly listed in the indices DAX30, MDAX and SDAX over a 6-year period (2006-2011). These companies underlie the highest standards of transparency and disclosure within the Prime Standard of the Frankfurt Stock Exchange and are subject to the new rules on female quota for supervisory boards and leadership positions. Financial institutions as well as companies, which were not a constituent of the DAX30, MDAX or SDAX in one of the analyzed years were excluded from the initial sample. Table 1 shows the composition of the final sample and the number of companies being excluded because of the reasons mentioned above. The final sample covers 64 companies that were constantly listed in the three indices between 2006 and 2011. Table 2 reports the industrial distribution of all sample companies according to the prime standard.

Table 1. The sample

Business year	Initial sample			Companies belonging to FBI-sector			Companies not being listed in one of the analyzed years			Final sample		
	DAX30	MDAX	SDAX	DAX30	MDAX	SDAX	DAX30	MDAX	SDAX	DAX30	MDAX	SDAX
2006	30	50	50	7	11	15	4	11	18	19	28	17
2007	30	50	50	7	8	15	3	14	19	20	28	16
2008	30	50	50	6	7	13	3	14	23	21	29	14
2009	30	50	50	5	7	11	4	11	28	21	32	11
2010	30	50	50	5	6	10	4	12	29	21	32	11
2011	30	50	50	5	6	12	4	11	28	21	33	10

Table 2. Final sample classified by industry

Automobiles, transportation & logistics (ATL)	Basic resources, construction & utilities (BCU)	Chemicals, pharma & healthcare (CPH)	Industrial (IND)	Media, technology, software & telecommunication (MTST)	Retail, consumer, food & beverage (RCF)
12	9	11	15	3	14

Based on their first names, the gender of the supervisory board members was identified. Among the 5,504 supervisory board seats, a total of 573 female supervisory board positions is found. The average ratio of female directors increased by 4.08 percentage points

between 2006 and 2011. Likewise, the proportion of companies with female supervisory board members improved from 67.19% in 2006 to 82.81% in 2011, while the total number of supervisory board positions remained almost constant during the sample period.

Table 3. Annual statistics of the supervisory boards

Business year	Total number of supervisory board seats	Total number of female supervisory board positions	Average quota of female supervisory board members	Average proportion of companies with female supervisory board members
2006	913	77	8.18%	67.19%
2007	917	85	8.74%	64.06%
2008	929	95	9.58%	73.44%
2009	914	98	9.76%	71.88%
2010	918	100	9.99%	76.56%
2011	913	118	12.26%	82.81%

In the regression, many variables are used, which express an annual change. Therefore the annual data of 2006 has only been used as the base year for the calculation. Hence, only 320 firm-year observations could be used in the panel regression.

2.2. Dependent variables. Accounting literature designates a variety of earnings quality measures, which can be classified into market-based and accounting-based measures. Market-based metrics measure the quality of earnings by its association with stock-based measures, while accounting-based methods measure the ability of current earnings to predict future cash flows and earnings. This paper focuses on accrual quality being part of the accounting-based measures, because board monitoring influences the managers' efforts in

estimating accruals that reflect future performance. Since the estimation of discretionary accruals depends on the chosen method, at first two alternative ex-post models are applied. The accrual methods used are the performance-matched discretionary accruals introduced by Kothari et al. (2005) and the modified Dechow, Dichev (2002) model as suggested in McNichols (2002). Both models have been extensively used in the prior literature (Francis et al., 2005; Jones et al., 2008; Jaggi et al., 2009; Barua et al., 2010; Peni, Vähämaa, 2010; Srinidhi et al., 2011; Qi, Tian, 2012; Vähämaa, 2014; Ran et al., 2014).

First, we estimate the absolute value of abnormal accruals by using the modified Jones (1991) model as applied in Kothari et al. (2005):

$$TA_{i,t} = \alpha_0 + \beta_1 + \beta_2(\Delta REV_{i,t} - \Delta AR_{i,t}) + \beta_3 GPPE_{i,t} + \beta_4 ROA_{i,t-1} + \text{year fixed effects} + \varepsilon_{i,t}, \quad (1)$$

Where $TA_{i,t}$ is total accruals, calculated as the difference between earnings and operating cash flow, $\Delta REV_{i,t}$ is the change in sales from year $t-1$ to year t , $\Delta AR_{i,t}$ is the change in account receivables, $GPPE_{i,t}$ is the gross property, plant and equipment and $ROA_{i,t-1}$ is return on assets in the previous year. Discretionary accruals of this model ($DA_{K_{i,t}}$) are defined as residual $\varepsilon_{i,t}$ from

equation (1). Some former studies argue that firms are more flexible in manipulating earnings with current accruals compared to long-term accruals (Peasnell et al., 2005; Barua et al., 2010). Therefore a modified version of the Dechow/Dichev model (2002) as applied in McNichols (2002) is used as metric of current discretionary accruals:

$$WC_{i,t} = \alpha_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \beta_4 \Delta REV_{i,t} + \beta_5 GPPE_{i,t} + \text{year fixed effects} + \varepsilon_{i,t}, \quad (2)$$

where $WC_{i,t}$ is working capital, calculated as $[WC_{i,t} = \Delta CA_{i,t} - \Delta Cash_{i,t} - \Delta CL_{i,t} + \Delta STD_{i,t}]$; $\Delta CA_{i,t}$ is change in current assets between year t and year $t-1$, $\Delta Cash_{i,t}$ is change in cash balance between year t and year $t-1$, $\Delta CL_{i,t}$ is change in current liabilities between year t and year $t-1$, $\Delta STD_{i,t}$ is change of debt in current liabilities between year t and year $t-1$ and $GFO_{i,t}$ is operating cash flow. Again the residual term of equation (2) is used to quantify the degree of earnings quality

($DA_MDD_{i,t}$). The variables used in both accrual models, except the constant (α_0), are scaled by the average of total assets between year $t-1$ and year t . To avoid, that our results might be driven by omitted unobserved firm characteristics, such as corporate culture, we use firm fixed effects under the assumption that corporate culture does not vary over time. Omitted variables that affect both the likelihood of appointing women to the supervisory board and promote conservative accounting practices

could lead to spurious correlations between board gender diversity and governance variables (Adams, Ferreira, 2009). Therefore, both regressions are estimated using panel data with year fixed effects.

$$DA_{i,t} = \alpha_0 + \beta_1 FEMALE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 LOSS_{i,t} + \beta_5 MB_{i,t} + \beta_6 SGROWTH_{i,t} + \beta_7 Big4_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where $DA_{i,t}$ denotes discretionary accruals for firm i in year t . The test variable in the regression is $FEMALE$, which is defined as one of the following alternatives:

(1) $FRATIO_{i,t}$ is the quota of women on the Supervisory Board for firm i in year t , computed as absolute number of female supervisory board members divided by absolute number of all supervisory board members; and

(2) $FCW_{i,t}$ is a dummy variable for firm i in year t , which is equal to one, if a women is head or deputy head of the supervisory board.

To neutralize potential disturbing factors between gender diversity and corporate governance six control variables have been included. These variables help to improve accuracy and robustness of the regression: $SIZE$ is the size of firm measured as the log of total assets. $LOSS$ is a dummy variable coded 1 if net income is negative and 0 otherwise. LEV is the financial leverage measured as total liabilities divided by total assets. MB is the ratio of market value of equity to book value. $SGROWTH$ is sales growth, measures as the change in sales between year $t-1$ and year t . $BIG4$ is a dummy for the Big 4 auditors, coded 1 if a firm is audited by Big 4 auditors and 0 otherwise.

Second, the two ex-ante measures of earnings quality, $BIG4$ and LEV are used, based on the assumption that improved external monitoring will improve earnings quality. Empirical studies indicate that firms which are audited by large audit firms have lower discretionary accruals (Francis et al., 1999). An explanation for this finding might be that larger audit firms provide higher quality audits to decrease the risk of litigation and to protect their reputation. Under the assumption that creditors are monitoring the firm and its accrual process, financial leverage might be a good indicator for the

After the estimation of discretionary accruals, the association between discretionary accruals and the gender of the supervisory board members is examined with the following panel regression:

extent of earnings management. These creditors could reduce information asymmetries and demand higher quality and more conservative accounting practices (Gavious et al., 2012).

3. Descriptive statistics

Table 4 presents the descriptive statistics for the different variables used in the analysis. Panel A reports the statistics for the full sample of 320 firm-year observations. As can be noted from Table 4, the sample firms are heterogeneous in terms of firm size, financial performance and growth. Panel B of Table 4 reports the descriptive statistics for the subsample with 236 firm-year observations with female supervisory board members. Panel C of Table 4 presents the t -statistics for the null hypothesis that there is no difference between firms with gender diversified boards and all-male supervisory boards. Some interesting features can be noted from these statistics. First, the mean value of absolute discretionary accruals, based on Kothari et al. (2005) and the modified Dechow/Dichev model (2002), are slightly lower in the subsample of firms with female directors, suggesting that female directors might reduce discretionary accruals. For the absolute discretionary accruals based on the modified Dechow/Dichev model (2002) the t -test for differences confirms that the difference is statistically significant lower than the 1% significance level, whereas it is statistically insignificant for the Kothari (2005) model. Second, the ex-ante proxies of earnings quality differ as well. Both measures are slightly higher in Panel B, indicating that external monitoring is higher in firms with female board representation. However the difference tests show that only the leverage ratio significantly differs between gender diversified boards and all-male supervisory boards, while the difference in $BIG4$ is statistically insignificant.

Table 4. Descriptive statistics

Variable	Mean	Standard deviation	Maximum	Minimum
Panel A: Summary statistics for all firms (N=320)				
DA_K	0.045	0.058	0.311	0.002
DA_MDD	0.017	0.017	0.097	0.000
$SIZE$	22.521	1.656	26.295	19.423
LEV	0.645	0.123	0.963	0.236
$LOSS$	0.122	0.328	1.000	0.000

Table 4 (cont.). Descriptive statistics

Variable	Mean	Standard deviation	Maximum	Minimum
<i>MB</i>	2.035	1.721	14.032	0.237
<i>SGROWTH</i>	0.060	0.146	0.524	-0.428
<i>BIG4</i>	0.894	0.309	1.000	0.000
Panel B: Summary statistics for firms with female supervisory board members (<i>N</i> = 236)				
<i>DA_K</i>	0.044	0.052	0.311	0.002
<i>DA_MDD</i>	0.015	0.014	0.065	0.000
<i>SIZE</i>	22.742	1.689	26.295	19.423
<i>LEV</i>	0.652	0.126	0.963	0.236
<i>LOSS</i>	0.144	0.352	1.000	0.000
<i>MB</i>	1.916	1.402	10.110	0.252
<i>SGROWTH</i>	0.067	0.148	0.524	-0.423
<i>BIG4</i>	0.907	0.291	1.000	0.000
Panel C: t-test for differences				
$H_0: DA_{K_F} = DA_{K_M}$		$t = 0.858$	$p\text{-value} = 0.392$	
$H_0: DA_{MDD_F} = DA_{MDD_M}$		$t = 3.635^{***}$	$p\text{-value} = 0.000$	
$H_0: LEV_F = LEV_M$		$t = -1.836^*$	$p\text{-value} = 0.067$	
$H_0: BIG4_F = BIG4_M$		$t = -1.267$	$p\text{-value} = 0.206$	

Pairwise correlation coefficients reported in Table 5 demonstrate that the absolute discretionary accruals based on Kothari (2005) and the modified Dechow/Dichev model (2002) are positively correlated with each other. The experimental variables, *FRATIO* and *FCW*, appear to correlate negatively with both measures of discretionary accruals. However, only the pairwise correlation between *DA_MDD* and *FRATIO* is negative and

significant at the 1% significance level, whereas the correlation coefficients between the *DA_K*, *FRATIO* and *FCW* are slightly above the 10% significance level. These results indicate that firms with a large proportion of female directors may be associated with less discretionary accruals. Furthermore it can be shown, that the correlation between our ex-ante measures of earnings quality, *BIG4* and *LEV*, and *FRATIO* is negative and statistically significant.

Table 5. Pearson correlation

	<i>DA_K</i>	<i>DA_MDD</i>	<i>SIZE</i>	<i>LEV</i>	<i>LOSS</i>	<i>MB</i>	<i>SGROWTH</i>	<i>BIG4</i>	<i>FRATIO</i>	<i>FCW</i>
<i>DA_K</i>	1.000									
<i>DA_MDD</i>	0.116**	1.000								
<i>SIZE</i>	-0.253***	-0.232***	1.000							
<i>LEV</i>	0.022	0.149***	0.426***	1.000						
<i>LOSS</i>	-0.028	0.014	-0.009	0.170***	1.000					
<i>MB</i>	0.074	-0.026	-0.306***	-0.210***	-0.162***	1.000				
<i>SGROWTH</i>	0.006	-0.020	-0.025	-0.086	-0.362***	0.078	1.000			
<i>BIG4</i>	0.080	0.004	0.355***	0.353***	0.098*	-0.080	-0.018	1.000		
<i>FRATIO</i>	-0.088	-0.163***	0.073	-0.133**	-0.016	-0.029	-0.019	-0.234***	1.000	
<i>FCW</i>	-0.087	-0.091	-0.060	-0.022	0.068	-0.038	-0.036	-0.042	0.293***	1.000

Note: *, ** and *** denote significance at the 0.10, 0.05 and 0.01 levels, respectively.

4. Empirical results

4.1. Multivariate regression analysis. Table 6 summarizes the regression results of the panel regression with absolute discretionary accruals as the dependent variable. Four alternative regressions have been estimated with different discretionary accruals (*DA_K* or *DA_MDD*) and different gender variables (*FRATIO* and *FCW*). All regressions have the same set of control variables and for all regressions Huber-White standard errors are used (Huber, 1967; White, 1980).

In Models 1.1 and 1.2 the discretionary accruals based on Kothari's (2005) model have been used as

dependent variable. As can be noted from Table 6, the adjusted R^2 of these models are around 12%, and the F-statistics are significant at the 1% level. The coefficient *FRATIO* is negative but statistically insignificant, whereas the coefficient *FCW* is negative and statistically significant at the 1% level. The coefficient estimates of the control variables indicate that the magnitude of discretionary accruals decrease with increasing firm size, negative income, market-to-book ratio and sales growth, and increases with leverage and Big 4 auditor.

In Models 2.1 and 2.2 the discretionary accruals based on the modified Dechow/Dichev (2002)

model have been used as dependent variable. As can be noted from Table 6, the adjusted R^2 of these models are around 15%, and the F-statistics are

significant at the 1% level. The coefficients *FRATIO* and *FCW* are negative and statistically significant at lower than the 5% significance level.

Table 6. Regressions results

Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2
	<i>DA_K</i>	<i>DA_K</i>	<i>DA_MDD</i>	<i>DA_MDD</i>
Intercept	0.273***	0.281***	0.083***	0.862***
	(5.82)	(5.88)	(6.28)	(6.36)
<i>FRATIO</i>	-0.033		-0.017**	
	(-0.13)		(-2.27)	
<i>FCW</i>		-0.023***		-0.008**
		(-3.72)		(-2.36)
<i>SIZE</i>	-0.013***	-0.013***	-0.004***	-0.004***
	(-5.80)	(-5.79)	(-5.58)	(-5.79)
<i>LEV</i>	0.061***	0.061***	0.039***	0.041***
	(2.95)	(3.03)	(4.65)	(4.76)
<i>LOSS</i>	-0.014	-0.013	-0.003	-0.003
	(-1.43)	(-1.36)	(-1.05)	(-1.02)
<i>MB</i>	-0.000	-0.001	-0.001	-0.001
	(-0.23)	(-0.34)	(-1.56)	(-1.62)
<i>SGROWTH</i>	-0.006	-0.007	-0.003	-0.003
	(-0.33)	(-0.35)	(-0.43)	(-0.42)
<i>BIG4</i>	0.032***	0.032***	0.001	0.002
	(4.46)	(4.30)	(0.29)	(0.76)
Adjusted R^2	0.113	0.122	0.148	0.151
F-statistics	6.37***	6.48***	6.32***	6.48***
No. of observations	320	320	320	320

Note: ***, ** and * denote significance at the 0.10, 0.05 and 0.01 levels, respectively. Values of t-statistics are in brackets.

The regression estimates reported in Table 6 indicate that the level of absolute discretionary accruals is lower for firms with female board members, suggesting that the accounting information quality improves with female representation in the supervisory board. Furthermore, supervisory boards with female heads or deputy heads are associated with less absolute discretionary accruals. These findings suggest that the number and position of women at board-level are related to a less aggressive accounting.

4.2. Robustness checks and limitations. Several additional tests have been conducted to examine the robustness of our empirical findings. First, some control variables have been eliminated to ensure that the results are not biased by potentially redundant variables. Thereby all regressions have been reestimated with *SIZE* and *MB* as the only control variables. The (untabulated) results are qualitatively similar to the results reported in Table 8. Second, in order to test for potential multicollinearity, we examined the variance inflation factors (VIF). As all *VIF* values are below 1.25, there is no multicollinearity problem. Third, a key assumption of the regression analysis is that the independent variables are exogenous and therefore no

relationship between the explanatory variables and the residuals exist. However it might be possible that the variables earnings quality and gender diversity in the boardroom are endogenous because of reverse causality. Reverse causality arises, when the dependent variable influences the independent variable. In this setting it might be possible, that the likelihood of women to join a firm is higher for firms with more conservative accounting. To address this problem, at first the Hausman specification test is used to test for endogeneity. The test results imply that all variables can be regarded as exogenous, since the χ^2 -statistics is below 0.11 in every regression. To further address this concern, we use the instrumental variable method to estimate the effect of female directors on discretionary accruals. Therefore we need an instrument that is correlated with the endogenous variable and uncorrelated with the dependent variable expect through control variables included in the regression (Adams/Ferreira, 2009). We use lagged female variables as instrumental variables, since these variables correlate with the present female variables but are uncorrelated with current discretionary accruals, expect through variables we control for. The second stage of our instrumental variables regression is reported in Table 7.

Table 7. 2 SLS-IV-Regressions results

Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2
	<i>DA_K</i>	<i>DA_K</i>	<i>DA_MDD</i>	<i>DA_MDD</i>
Intercept	0.271***	0.284***	0.083***	0.088***
	(5.82)	(5.99)	(6.28)	(6.55)
<i>FRATIO</i>	-0.052		-0.033**	
	(-1.35)		(-2.37)	
<i>FCW</i>		-0.034***		-0.013**
		(-3.31)		(-2.56)
<i>SIZE</i>	-0.012***	-0.013***	-0.004***	-0.004***
	(-5.60)	(-5.89)	(-5.21)	(-5.95)
<i>LEV</i>	0.055***	0.061***	0.037***	0.041***
	(2.65)	(3.05)	(4.39)	(4.77)
<i>LOSS</i>	-0.013	-0.012	-0.003	-0.003
	(-1.41)	(-1.33)	(-1.00)	(-0.95)
<i>MB</i>	-0.000	-0.001	-0.001	-0.001
	(-0.24)	(-0.39)	(-1.64)	(-1.72)
<i>SGROWTH</i>	-0.007	-0.007	-0.003	-0.003
	(-0.36)	(-0.37)	(-0.045)	(-0.43)
<i>BIG4</i>	0.028***	0.032***	-0.001	0.002
	(4.07)	(4.30)	(-0.19)	(0.72)
<i>R</i> ²	0.107	0.120	0.141	0.144
Wald Chi ² -statistics	42.50***	46.47***	48.38***	49.92***
No. of observations	319	319	319	319

Note: ***, ** and * denote significance at the 0.10, 0.05 and 0.01 levels, respectively. Values of z-statistics are in brackets.

The regression results tabulated in Table 7 are similar to the results reported in Table 6, indicating that the representation of female supervisory board members significantly reduces discretionary accruals and supervisory boards with female heads or deputy heads are associated with less absolute discretionary accruals.

We acknowledge several limitations to the empirical analysis. First, the sample consists of the DAX30, MDAX and SDAX firms, and is thereby limited to very large publicly traded firms. Thus, the empirical results are not necessarily applicable to smaller firms. Moreover, it should be noticed, that the low number of female supervisory board members in the underlying sample may reduce the statistical power of the tests. Second, due to the fact that the data are hand-collected, we were forced to limit the sample to 64 firms and six fiscal years which limits the transferability and generalizability of the study results. Third, we recognize that the applied accrual models may not provide perfect estimates of earnings quality. Fourth, it should be noted that our findings may suffer from a

self-selection bias because of omitted variables or simultaneousness of firm characteristics.

Conclusion

In April 2015, the German parliament passed a law that requires listed companies with employee representation on their supervisory boards to give 30 percent of supervisory board to women beginning next year. Motivated by findings in prior research on gender-based differences in a variety of decisions settings and the expansion of skills, experiences and perspectives by gender diversity, we hypothesize that gender diversified boards might improve the quality of financial reporting. In this paper a unique setting of 64 German DAX30, MDAX and SDAX-listed companies is analyzed. The empirical findings demonstrate that gender diversity on German supervisory board reduces discretionary accruals. Additionally, firms with female head or deputy head of the supervisory board tend to have less absolute discretionary accruals. These results suggest that the number and position of women at board-level have implications for the quality of financial reporting.

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