**CORPORATE GOVERNANCE
IN GERMANY**

SECTION 3

THE EFFECTS OF OWNERSHIP CONCENTRATION ON SUSTAINABILITY: A CASE OF LISTED FIRMS FROM USA, UK AND GERMANY

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Abstract

Concentrated ownership has been speculated to play a direct role in leading firms to focus more on long-term sustainability. Concentrated ownership, however, can take many different forms, with some forms more common in certain countries, and we posit that the specific form of ownership mediates the impact on sustainability. Additionally, we posit that firms operating at different scales have fundamentally different characteristics which can further impact this relationship. Analyzing a sample of firms from the USA, UK, and Germany using Arellano- Bond GMM, we investigate the relationship between ownership concentration, firm growth and sustainability measures comparatively. Our results show that these relationships are not linear, but are rather dependent on the prevalent form of ownership concentration (determined by country) and the scale (small, medium or large) of the firm. Approaches to sustainability appear to be influenced by not just the owners / investors but also by the type of control and broader contexts, explaining differing national trends.

Keywords: Ownership Concentration, Sustainability, Firm Size, Arellano Bond GMM

1. INTRODUCTION

Firms with more concentrated ownership structure, such as family-owned firms, form a major part of most economies (Barontini and Caprio, 2006; Faccio and Lang, 2002; Morck et al., 2005). The previous research on sustainability and ownership structure (Barnea and Rubin, 2010; Loannau and Serafeim 2010; Mackenzie, Rees and Rodinova 2011; Rees and Mackenzie 2011; Dam and Scholtens, 2012 and Rodionova and Rees, 2013) is primarily based on controlling ownership and its impact on corporate social responsibility and its various elements; this study further refines this approach by analyzing differential effects among firms of different scales.

Concentration of ownership has increased significantly over the last decades (OECD, 2014) and

sustainability is a key factor in improving the relationship between corporations and their major stakeholders (Jo and Harjoto, 2012), because a major feature of equity holdings is the willingness of owners to decide for long-term or short-term incentives. Owners with a short-term focus prefer projects where they can maximize their benefits in the short-term without needing to wait for long-term gains and thus their decisions can have a negative effect on the long-term sustainability of firms (Siegel and Vitaliano, 2007; Rees and Mackenzie, 2011). We expect that firms with more concentrated ownership do not have only short-term interests in mind, and that investors, because of their tight control on management, emotional and personal attachments and financial associations with the company, prefer long-term viability and the continued existence of

the company to short-term profits (Kappes and Schmid, 2013). Using a sample of firms from Germany, the UK and the USA for the period 2004-2014, we find that concentrated ownership is positively related to the sustainability of firms and that this relationship is more significant and stronger in the cases of the USA and the UK than for Germany. In addition, we find that within groupings of large firms in the USA and the UK firms became less sustainable as they became larger. This effect is even stronger in the case of the USA.

Further, this study diverges from prior studies on sustainability and ownership structure (Bernea and Rubin, 2010; Mackenzie, Rees, and Rodionova, 2013; Rees and Rodionova, 2011; Rodionova and Rees, 2015) in several ways. First we study the impact of ownership concentration on the sustainability of listed firms in the leading economies of the USA, UK and Germany in a comparative manner. Second, we observe the impact of concentrated ownership on the sustainability of firms within the full sample of firms and subsequently organize the data from each country into subgroups of large, medium and small cap firms on the basis of market capitalization. This division of firms into three different subgroups is critical to understanding the different incentives and difference in approaches of owners at different scale firms. Our final contribution relates to the use of a series of estimation techniques ranging from simple OLS, quantile regression, and panel data techniques to dynamic panel models. Regarding the final results we rely on the panel dynamic GMM methods by Arrelano and Bond (1991). This estimation technique makes it possible to overcome the inherited problem of endogeneity in ownership structure data and some unobservable factors that might be correlated with independent variables and affect the dependent variable (Keasey et al. 2015). Further, panel dynamic models also captures the dynamic nature of variables relating to corporate finance (Flannery et al., 2013).

The remainder of the paper is structured as follows: Section 2 presents a literature review and hypothesis development. Section 3 provides the research methods. Section 4 describes findings and Section 5 presents our conclusions.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESIS

Ownership concentration indicates the percentage of shares held by insiders and large individual and institutional investors. In other words: the phenomenon of ownership concentration refers to how tightly the equity of the firm is held (Fama and Jensen, 1983; Morck et al., 1989; Claessen et al., 1996). The current literature on the concentration of ownership and sustainability suggests that investors who invest in firms with a higher ownership concentration have better control over management and have more power in decision-making to influence corporate behavior on environmental and social issues (Campbell, 2007; Kang and Moon, 2012).

Ownership concentration implies that a limited set of people are active as the major stakeholders of a firm, and that these people are more likely to be active in the day-to-day operations of the firm. The

two most common forms of concentrated ownership are family-owned firms and big business groups. (La Porta et al., 1999) According to Faccio and Lang (2002) almost half of firms in Western Europe demonstrate some form of concentrated family ownership. In the US one third of public firms are controlled by either big business groups or families (Anderson and Reeb, 2003). In order to enhance operational efficiency corporations are often focusing on sustainability and also converging toward higher concentrations of ownership. That is why it is important to address the relationship between concentrated ownership and sustainability within corporations in developed economies (Berry and Rondinelli, 1998; Edmans, 2011). Moreover, it has been suggested that sustainable performance can be a source of competitive advantage (Aguilera et al., 2006; McWilliams and Siegel, 2001; Porter and van der Linde, 1995). Sustainable performance introduces strategic benefits by improving the relationship among different stakeholders e.g. consumers, suppliers and employees (Becker et al, 2010; Brekke and Nyborg, 2008; McWilliams and Siegel, 2001; Siegel and Vitaliano, 2007; Turban and Greening, 1997) and these strategic benefits ultimately increase the market value of a firm (Jo and Harjoto, 2011; Jo and Harjoto, 2012). Previous literature also highlights that majority equity holders closely monitor the management of the company they have a stake in in order to protect their interests and very often they go as far as also being part of the company's management (Burkart et al., 1997).

Thus taking a step forward we hypothesize that firms with more concentrated ownership are more tightly controlled thus reducing agency problems, and this can have a positive impact on the long-term sustainability of the firm.

Hypothesis 1: There is a positive relationship between the concentration of ownership and sustainability of a firm and its individual components of social and environmental performance.

Furthermore, family owners are in a good position to oversee and monitor the operations of the firm, due to their personal interest in the firm's success, long-term involvement with the firm, and the fact that they are often directly involved in its management (Anderson and Reeb, 2003; Le Breton-Miller and Miller, 2009; Sraer and Thesmar, 2007). We diverge from the aforementioned studies by positing that it is important to consider the differences in type of ownership concentration (e.g. in form of investment companies, mutual funds and banks) that prevail in each country (USA, UK and Germany). Building on the aforementioned studies it is also important to differentiate between small, medium and large cap firms, while observing the impact of ownership concentration on sustainability of the firm. So far the existing literature has not sufficiently controlled for differences in concentrated ownership in regions/countries and firm scale. The differences of scale that separate small, medium, and large firms affect so many aspects of their daily operation and decision-making and to such an extent that they can effectively be treated as different entities altogether. That is why the results on the connection between concentrated ownership and sustainability are still inconclusive. If

we go into depth we find that in Germany most of the equity of firms is held by banks (Edwards et al., 2000; Hill and Thomas, 2015) whereas, in the UK and in the USA non-bank institutional investors have more stake in ownership compared to any other type of concentrated ownership (Mallin et al., 2005). Further, when we go into the details of the composition of institutional ownership concentration set up in the USA and UK, we see that in the UK insurance companies and pension funds hold most of the equity, while in the USA the most common institutional investors demonstrating concentrated ownership are investment companies (Binay, 2005 and Aguilera et al., 2006). Because of the difference in ownership concentration in USA, UK and Germany the impact of ownership concentration on sustainability of firms may also differ in each country. On the basis of this argument we make our second hypothesis.

Hypothesis 2: The impact of concentrated ownership on a firm's sustainability will differ based on the differing types of ownership in each respective country.

Moreover, within each country the size of firms is also very important when we study the phenomenon of sustainability at the firm level in developed economies in a comparative manner. Previous studies (Bernea and Rubin, 2010; Mackenzie, Rees, and Rodionova, 2011; Rees and Rodionova, 2013; Rodionova and Rees, 2015) treat firm size as a singular variable that may correlate with firm outcomes. However, we argue that the management of firms at different scales i.e. large cap, medium cap and small cap firms in the presence of certain ownership concentration may have different approaches and incentives for long-term sustainability. Models and strategies which work for small cap firms may not work for medium or large cap firms. Previous studies conclude that large firms provide better cash flows and demonstrate good performance in terms of profitability (La Porta et al., 2002; Stierwald, 2009). But what about the sustainability of large corporations? We posit that small and medium sized firms are easier to influence towards sustainability through concentrated ownership. With more stakes in ownership the owners in such firms have more personal, emotional and financial attachment and can monitor the managers more easily (Burkart et al., 1997). Thus our final hypothesis of study is the following:

Hypothesis 3: Firm scale moderates a firm's sustainability given a certain type of concentrated ownership.

3. RESEARCH METHODS

3.1. Sample and data

To observe the impact of concentrated ownership on sustainability of firms in the USA, UK and Germany we collected data from Thomson Reuters Data Stream. The time period for our analysis is 2004-2014. To observe the impact of different size levels of firms on the sustainability of firms we divide the firms into the subgroups of large, medium and small cap firms on the basis of their market capitalization. We consider only manufacturing, utilities and industrial firms from the USA, UK and Germany. We

exclude firms with less than five years of available data. We thus obtain an unbalanced panel of 22,900 observations. Further, we use the panel dynamic model which is the best solution for unbalanced panel data (Keasey et al., 2015) as some firms may be delisted as a result of bankruptcy and ultimately removed from the database over time.

3.2. Variables and their definitions

Consistent with prior research on CSR we measure the sustainability with environmental and social factors, which were obtained from Thomson Reuter's Asset4 database (e.g., Cheng et al. 2014; Eccles et al. 2014; Eccles et al. 2015; Ioannou and Serafeim 2012; Mackenzie et al. 2013). The Thomson Reuters Asset4 data provides ESG factors. However, to avoid the endogeneity problem and to get robust results we ignored the governance factor, basically sustainability on the environmental and social factors. Contrary to the ESG data from KLD, Asset4 provides the data on CSR not only for the US but also for companies from Europe. Asset4 uses publicly available information to fill the more than 750 data points based on 280 ESG related key performance indicators (Thomson Reuter, 2015).

Company social performance consists of issues such as: safeguarding human rights, maintaining diversity in its workforce, providing equal opportunities to its workforce, offering quality working conditions, rendering healthy and safe work environments, commitments and efforts for introducing value added products and services, and offering development and training opportunities to workforce, while environmental performance includes aspects such as: the use of nuclear energy, amount of research and development expenditure on the environment, CO_2 emissions, amount of total waste, withdrawal of total water, resource reduction, and the monitoring of environmental supply chain (Thomson Reuters 2015). We computed the sustainability score $Sust_{it}$ for company i in year t as the equally weighted average of the environmental and social factors.

Return on assets (ROA_{it}) is measured as net income divided by total assets. Concentrated ownership (Cow_{it}) is measured as a percentage of shares held by all insiders and the top 5 percent shareholders.

Market capitalization ($MCAP_{it}$) measured as market price per share times the number of shares outstanding. It shows the size of each firm and it is subsequently used to obtain the scale subgroups of small, medium and large cap firms (Lo and Leung, 2009). A firm is considered large ($LCAP_{it}$) if its market capitalization is ≥ 8 billion. Similarly, a firm falls in the subgroup of medium cap firms ($MEDCAP_{it}$) if it has a market capitalization ≥ 1 billion and < 8 billion. A firm is considered small cap ($SCAP_{it}$) if its market capitalization is < 1 billion.

3.3. Research methods

Initially we employ the following models on the full sample of each country. Subsequently we divide the firms for each country into subgroups of small, medium and large cap firms based on their market capitalization to test the third hypothesis of our study. This division of firms into different

subgroups of firms extends the prior literature on corporate governance and firm performance (Leung, 2009).

$$Sust_{it} = \alpha + \beta_1 Cow_{it} + \beta_2 ROA_{it} + \beta_3 MCAP_{it} + \varepsilon_{it} \qquad (1)$$

$$Ssc_{it} = \alpha + \beta_1 Cow_{it} + \beta_2 ROA_{it} + \beta_3 MCAP_{it} + \varepsilon_{it} \qquad (2)$$

$$Esc_{it} = \alpha + \beta_1 Cow_{it} + \beta_2 ROA_{it} + \beta_3 MCAP_{it} + \varepsilon_{it} \qquad (3)$$

Our initial results are based on OLS models. However, in case of simple OLS the estimates have an upward bias. This is because OLS estimates suffer from omitted variable bias and ignores the unobserved firm heterogeneity that leads to short panel bias in dynamic data (Flannery et al., 2013). Therefore, we use quantile regression to capture the relationship between concentrated ownership structure and firm sustainability. The reason for using quantile regression is that it estimates conditional quantiles of a response variable distribution in a linear model that provides a comprehensive view of a possible causal relationship between variables (Cade and Noon, 2003). For example, if we find a positive relationship between concentrated ownership and sustainability it may be because of the effect of equity holders on sustainability – conversely, this may also represent that certain equity holders are drawn to sustainable firms. The latter case can be consistently ruled out if we can illustrate that firms with low sustainability are also adversely affected by concentrated ownership in different firms.

Thus, because of this causal relationship we use quantile regression to test the relationship between sustainability and explanatory variables at different quantiles of dependent variables.

Thirdly, we move ahead and use the fixed effect models to control for the potential influence of omitted control variables. We hypothesize that those variables not included in the model may effect sustainability and concentrated ownership in general. Furthermore, using a fixed effect model assures that the explanatory power of the model is driven by the disparities between the firms and not by the presence of differences within the firms (Rees and Rodionova, 2015). Finally, we use the panel dynamic model to contribute to the literature and remove the acknowledged limitations of prior studies (Mackenzie, Rees, and Rodionova, 2013; Rees and Rodionova, 2015). The reason for using the panel dynamic model is that the corporate finance data used in the study was based on unbalanced panel data and has the feature of missing observations. Further, omitting lagged dependent variables like $Sust_{t-1,it-2}$ in the fixed effect model may result in autocorrelation and the panel data set of the study has a relatively short time frame (2004-2014) and a larger number of observations (n = 22900). According to Judson and Owen (1999) there

is a severe bias in panel data even if the number of time periods (T) is greater than 30. Therefore, to avoid the short period panel bias and autocorrelation problem in fixed effect model we decided to use the Arrellano-Bond (1991) difference GMM estimator initially proposed by Holtz-Eakin, Newey and Rosen (1988).

To cope with the problems of fixed effects the difference GMM uses first difference to transform equations 1, 2 and 3 into the following equations 4, 5 and 6 respectively.

$$\Delta Sust_{it} = \beta_1 \Delta Sust_{i,t-1} + \beta_2 \Delta Cow_{it} + \beta_3 \Delta ROA_{it} + \beta_4 \Delta MCAP_{it} + \mu_{it} \qquad (4)$$

$$\Delta Ssc_{it} = \beta_1 \Delta Ssc_{i,t-1} + \beta_2 \Delta Cow_{it} + \beta_3 \Delta ROA_{it} + \beta_4 \Delta MCAP_{it} + \mu_{it} \qquad (5)$$

$$\Delta Esc_{it} = \beta_1 \Delta Esc_{i,t-1} + \beta_2 \Delta Cow_{it} + \beta_3 \Delta ROA_{it} + \beta_4 \Delta MCAP_{it} + \mu_{it} \qquad (6)$$

General transformation form of equation 4, 5 and 6 is given as follows:

$$\Delta \gamma_{i,t-1} = \alpha \Delta x_{i,t} \beta + \Delta \mu_{i,t} \qquad (7)$$

Further, fixed effects which are time invariant and related to the outside environment may be correlated with the explanatory variables. These fixed effects are enclosed in the error term in equation 1, 2 and 3 respectively, which consist of the unobserved firm specific effects v_i, and specific error ε_{it} related with observations.

We can write this as:

$$\mu_{it} = v_i + e_{it} \qquad (8)$$

However, the fixed firm specific effect is removed as it is time invariant with transforming the regressors by first differencing. Thus from equation 8 we get:

$$\Delta \mu_{it} = \Delta v_i + \Delta e_{it} \qquad (9)$$

or

$$\mu_{it} - \mu_{i,t-1} = (v_i - v_i) + (e_{it} - e_{i,t-1}) = e_{it} - e_{i,t-1} \qquad (10)$$

4. RESULTS AND DISCUSSION

4.1. Descriptive statistics

Panel A provides the mean, standard deviation and minimum and maximum values of the variables used in the above models for Germany. The descriptive statistics indicate that among firms in Germany, the average ownership concentration is 39.74%, while the maximum level of ownership concentration is 90.50%. *Panel B* reports the correlation matrix of key variables used in empirical models for Germany.

Panel A. Summary statistics for Germany

Variables	Mean	Std.dev.	Min.	Max.
Sustainability	73.216	24.54	11.22	97.67
Social Performance	71.306	26.82	6.30	98.53
Environmental Performance	75.12	26.39	9.520	97.02
Return on Assets (%)	49.32	20.94	0.00	100.00
Concentrated Ownership (%)	39.743	29.82	0.00	90.50
Market Capitalization (billion euro)	13714	18097	0.91	91970

Panel B. Correlation matrix

	SUS	**ROA**	**COW**	**MCAP**	**LCAP**	**MEDCAP**	**SCAP**
SUS	1						
ROA	-0.16	1					
COW	0.08	-0.11	1				
MCAP	0.40	-0.00	0.02	1			
LCAP	0.49	-0.02	0.01	0.70	1		
MEDCAP	-0.39	0.07	-0.08	-0.56	-0.82	1	
SCAP	-0.03	-0.10	0.07	-0.15	-0.17	-0.20	1

Panel C provides the mean, standard deviation and minimum and maximum values of the variables used in above models for the UK. The summary statistics for the UK illustrate that on average, the ownership concentration in firms of UK is 63.57, while the maximum level of ownership concentration is 90.55. Additionally, *Panel D* provides the correlation matrix for key variables used in empirical analysis for UK.

Panel C. Summary statistics for UK

Variables	Mean	Std. dev.	Min	Max
Sustainability	61.62	23.69	8.09	97.51
Social Performance	63.39	24.44	6.44	98.32
Environmental Performance	59.86	26.98	9600	97.14
Return on Assets (%)	56.91	21.25	0.00	100.00
Ownership Concentration (%)	63.57	27.07	0.00	90.55
Market Capitalization [billion in pounds]	5943	2037	0.001	20000

Panel D. Correlation matrix

	SUST	**ROA**	**COW**	**MCAP**	**LCAP**	**MEDCAP**	**SCAP**
SUST	1						
ROA	-0.09	1					
COW	0.30	-0.05	1				
MCAP	0.23	0.11	-0.02	1			
LCAP	0.37	0.08	0.06	0.60	1		
MEDCAP	0.15	0.05	0.08	-0.13	-0.28	1	
SCAP	-0.37	-0.11	-0.11	-0.25	-0.31	-0.78	1

Panel E provides the mean, standard deviation and minimum and maximum values of the variables used in above models for the USA. These descriptive statistics indicate that on average, ownership concentration is 45.77 in firms in the USA, while the maximum value of ownership concentration is 90.56. Further, panel F illustrates the correlation matrix for key variables used in the empirical analysis for the USA.

Panel E. Summary statistics for USA

Variables	Mean	Std. dev.	Min	Max
Sustainability	48.17	29.63	6.08	97.970
Social Performance	48.56	31.08	3.43	98.88
Environmental Performance	47.77	31.75742	8.570	97.34
Return on Assets %	46.87	24.40	0.00	100.00
Ownership Concentration %	45.77	32.85	0.00	90.56
Market Capitalization (billion in dollar)	50000.	0.006	0.001	300000

Panel F. Correlation matrix

	SUST	**ROA**	**COW**	**MCAP**	**LCAP**	**MEDCAP**	**SCAP**
SUST	1						
ROA	0.04	1					
COW	0.18	0.11	1				
MCAP	0.03	0.04	-0.05	1			
LCAP	0.22	0.05	-0.03	0.09	1		
MEDCAP	-0.11	0.01	0.05	-0.07	-0.76	1	
SCAP	-0.17	-0.10	-0.034	-0.03	-0.37	-0.31	1

4.2. Empirical results

Although we use various estimation techniques we will only discuss the results of GMM Arrellano-Bond since they best account for the dynamic nature of the variables employed in our study. As mentioned above the other estimation methods have inherent limitations and are thus only presented to allow comparisons to the existing literature.

Overall, the comparative descriptive results indicate that on average ownership concentration is high in the UK compared to the USA and Germany. Similarly, the descriptive results also show that on

average firms in Germany seem more sustainable compared to the UK and the USA.

The results of Table 1 on the full sample of firms indicate that in the case of Germany, ownership concentration has a significant negative impact on sustainability level of firms, while in the cases of the USA and the UK this impact is significant and positive. These results illustrate that without grouping firms on the basis of size, the firms in Germany with higher ownership concentration are less sustainable. Table 2 deals with the results of the subgroups of large cap firms in the USA, UK and Germany. According to these results ownership concentration has a highly significant and positive effect on sustainability in the case of the USA. In the case of the UK the impact of ownership concentration is also positive but not as strong as in the USA. These results are in line with the hypothesis of our study. Interestingly, firm growth among large cap firms in the USA has a significant negative impact on sustainability in contrast to Germany where growth among large cap firms has a significant positive impact on sustainability. The reason may be that big firms in the USA are focusing on the shareholder wealth maximization objective by preferring short-term gains over long-term sustainability, and it seems as if they are expanding their businesses by reinvesting their profits at the expense of sustainability. Furthermore, the results show that in the case of Germany and the UK ROA has a significant negative impact on sustainability, which is in line with the

findings of Dam and Scholtens, (2012), while, in the case of the USA, ROA is not found to be significant.

Table 3 summarizes the results of the subgroup of medium cap firms, sorted by country. These results illustrate that in the USA ownership concentration has a significant and positive impact on the sustainability of a firm. Similarly, being a medium cap firm in the USA or the UK has also a significant and positive impact on a firm's sustainability. No significant relationship was found for firms in Germany.

Table 4 shows the results for the subgroup of small cap firms. Accordingly, ownership concentration in small cap firms has a positive impact on sustainability in UK and USA, with no significant effect in Germany. The effect of ROA on the sustainability of firms in the subgroup of small firms is significant and negative for Germany and the UK but positive and significant for the USA. These results regarding ROA in Germany and UK are in line with the prior study by Dam and Scholtens (2012), while in the case of the USA the results of ROA are in line with the findings of Rees and Rodionova (2015). Moreover, the results of Table 4 indicate that firm growth within small cap firms is positively and significantly associated with sustainability in the USA, UK and Germany.

Additional analyses were performed separating sustainability into its separate social and environmental components. The results did not reveal any significant differences between or within these factors, and these results have been omitted.

Table 1. Results with full sample of firms

	Germany				UK				USA			
	OLS	QR	FE	AB	OLS	QR	FE	AB	OLS	QR	FE	AB
ROA	-0.182 (0.001***)	-0.096 (0.16)	-0.161 (0.000***)	-0.200 (0.000***)	-0.124 (0.000***)	-0.131 (0.002***)	-0.049 (0.034*)	-0.890 (0.000***)	0.027 (0.774)	0.004 (0.774)	0.040 (0.000***)	-0.207 (0.082*)
COW	0.048 (0.224)	-.003 (0.939)	0.091 (0.033**)	-0.152 (0.057)	0.264 (0.000***)	0.358 (0.000***)	0.045 (0.1190)	0.372 (0.079*)	0.170 (0.000***)	0.299 (0.000***)	0.141 (0.000***)	0.284 (0.000***)
MCAP	0.005 (0.000***)	0.003 (0.000***)	0.005 (0.4681)	-0.004 (0.3731)	0.003 (0.000***)	0.002 (0.000***)	0.008 (0.1271)	0.004 (0.2192)	0.002 (0.000***)	0.082 (0.023**)	0.002 (0.000***)	1.00 (0.017**)
R²	0.19		0.84		0.16		0.76		0.03		0.10	
No. of Obs.	353	353	353	187	1317	1317	1317	873	21230	21230	21230	12061

This table provides coefficients and p-values from panel least square (OLS), quantile regression (QR), fixed effect models (FE) and Arrelano-Bond panel dynamic models (AB). Concentrated ownership (COW) is measured as percentage of shares held by all in. The above results are obtained by employing the full sample for each country. We use market capitalization (MCAP) as a measure of size and in subsequent tables we form subgroups of large, medium and small cap firms on the basis of market

capitalization. All variables including return on assets (ROA) as a control variable are defined in the methodology section of our study under the heading of variables and their definitions. We used GMM estimation to remove endogeneity. The intercepts are not included in table and p- values are reported in parentheses, ***, ** and * illustrate the significance level at 1 percent, 5 percent and 10 percent respectively.

Table 2. Results on sustainability for subgroups of large cap firms

	Germany				UK				USA			
	OLS	QR	FE	AB	OLS	QR	FE	AB	OLS	QR	FE	AB
ROA	-0.170 (0.001***)	-0.099 (0.151)	-0.190 (0.005**)	-0.167 (0.000***)	-0.129 (0.000***)	-0.107 (0.006**)	-0.046 (0.045)	-0.879 (0.000***	0.012 (0.122)	0.008 (0.577)	0.025 (0.001***)	0.344 (0.009)
COW	0.052 (0.163)	0.002 (0.296)	0.039 (0.296)	-0.009 (0.892)	0.237 (0.000***)	0.275 (0.000***)	0.044 (0.126)	0.464 (0.02**)	0.176 (0.000***)	0.281 (0.000***)	0.147 (0.000***)	0.582 (0.000***)
MCAP	24.391 (0.000***)	21.345 (0.000***)	24.289 (0.000***)	6.513 (0.000***)	26.9030. (0.000***)	24.923 (0.000***)	9.601 (0.001***)	-3.483 0.8813	13.791 (0.000***)	23.785 (0.000***)	13.162 (0.000***)	-30.102 (0.000***)
R²	0.27		0.32		0.23		0.77		0.09		0.15	
No. of Obs.	185	185	185	98	651	651	651	432	13780	13780	13780	7829

*Note: The p- values are reported in parentheses, ***, ** and * illustrate the significance level of variable at 1 percent, 5 percent and 10 percent respectively*

Table 3. Results on sustainability for subgroups of medium cap firms

	Germany				UK				USA			
	OLS	QR	FE	AB	OLS	QR	FE	AB	OLS	QR	FE	AB
ROA	-0.1590 (0.005**)	-0.094 (0.168)	-0.181 (0.001***)	-0.1577 (0.000***)	-0.100 (0.005**)	-0.141 (0.009)	-0.053 (0.023**)	-0.872 (0.000***)	0.031 (0.000***)	0.019 (0.250)	0.044 (0.000***)	0.332 (0.032**)
COW	0.032 (0.421)	0.015 (0.710)	0.020 (0.611)	-0.068 (0.177)	0.249 (0.000***)	0.357 (0.000***)	0.041 (0.158)	0.480 (0.013**)	0.174 (0.000***)	0.297 (0.000***)	0.145 (0.000***)	0.673 (0.000***)
MCAP	-18.948 (0.000***)	-19.019 (0.000***)	-18.466 (0.000***)	-8.525 (0.000***)	6.659 (0.000***)	7.139 (0.001***)	2.619 (0.000***)	-4.851 0.036	-7.613 (0.000***)	-12.241 (0.000***)	-7.291 (0.000***)	37.739 (0.000**)
R²	0.23		0.22		0.12		0.77		0.05		0.11	
No. of Obs.	97	97	97	51	345	345	345	228	4070	4070	4070	2312

Note: The p- values are reported in parentheses, ***, ** and * illustrate the significance level of variable at 1 percent, 5 percent and 10 percent respectively

Table 4. Results on sustainability for subgroups of small cap firms

	Germany				UK				USA			
	OLS	QR	FE	AB	OLS	QR	FE	AB	OLS	QR	FE	AB
ROA	-0.193 (0.002***)	-0.171 (0.029*)	-0.220 (0.000***)	-0.323 (0.000***)	-0.138 (0.000***)	-0.147 (0.000)	-0.057 (0.014*)	-0.879 (0.000***)	0.009 (0.255)	0.001 (0.884)	0.023 (0.003***)	0.525 (0.000***)
COW	0.058 (0.177)	0.013 (0.725)	0.041 (0.337)	0.118 (0.174)	0.220 (0.000***)	0.294 (0.000***)	0.035 (0.232)	0.485 (0.012**)	0.165 (0.000***)	0.274 (0.000***)	0.136 (0.000***)	0.592 (0.000***)
MCAP	-7.249 (0.260)	-14.480 (0.087)	-6.866 (0.282)	25.378 (0.024**)	-17.164 (0.000***)	-21.303 (0.000***)	-4.533 (0.001***)	4.322 (0.000***)	-14.261 (0.000***)	-18.859 (0.000***)	-13.531 (0.000***)	20.979 (0.041**)
R²	0.03		0.09		0.13		0.76		0.06		0.12	
No. of Obs.	71	71	71	38	321	321	321	213	3380	3380	3380	1920

Note: The p- values are reported in parentheses, ***, ** and * illustrate the significance level of variable at 1 percent, 5 percent and 10 percent respectively

The results of the full sample indicate that in the case of Germany ownership concentration has a significant negative impact on the sustainability level of firms, while in the case of the USA and the UK this impact is significant and positive.

The positive impact of ownership concentration on sustainability remains significant for all subgroups in the UK and USA, whereas the results of the subgroups for Germany are not significant and thus inconclusive.

With respect to company size we only see a clear pattern of significant results regarding US companies. They become more sustainable the bigger they get with the exception of the large cap companies which seem to become less sustainable. In contrast, large cap firms in Germany become more sustainable the bigger they become, while medium cap firms become less sustainable.

5. CONCLUSION

This study investigates the impact of ownership concentration on the sustainability of firms in Germany, the USA and the UK at different levels of scale. In particular, we observed the impact of ownership concentration on sustainability firstly for the full sample of firms and secondly for subgroups of large, medium and small cap firms. We draw several conclusions from the results of our analysis.

For Germany, regarding the full sample, our results are in line with the studies of Siegel and Vitaliano (2007), Rees and Mackenzie (2011) and Rodionova and Rees (2015), while in the cases of the USA and the UK the results of the full sample are consistent with Neubaum and Zahra (2006) and Kappes and Schmid (2013). Moreover, in the case of the control variable i.e. ROA the results are in line with the findings of Dam and Scholtens (2012).

Our first hypothesis is in line with our results for the UK and the US but not with the results for Germany, suggesting that the relationship between ownership concentration and sustainability is not a simple linear relationship and likely depends on the specific type of ownership and structures of control. We can infer that, in different countries, different types of ownership concentration have different impacts and preferences for sustainability, which is in line with our second and third hypotheses.

Firms in Germany with a greater concentration of ownership seem to have a short-term approach focusing on shareholder wealth maximization. Thus the behavior of firms in Germany (without grouping firms by size) is in line with the prior studies (Barnea and Rubin, 2010; Mackenzie, Rees, and Rodionova, 2013; Rees and Rodionova, 2013; Rodionova and Rees, 2015). The fact that banks hold most of the equity of firms in Germany likely influences how much pressure those firms have to show short-term profits, as banks have to meet the demands of depositors for their own funds. The recent Volkswagen scandal reflects this short term approach as well, as a strategy for short-term cost savings was implemented despite the significant risk of financial penalties and a damaged public reputation. However, in the case of the USA and UK the effect reflects that the equity holders are not in so much of a hurry and are less interested in short-term gains; their objectives are rather to develop a long-term sustainable business in both their best interests and the interest of stakeholders.

By using subgroups of firms on the basis of scale we find that the large cap firms in the USA become less sustainable as they grow. In contrast, large cap firms in Germany become more sustainable the bigger they become. This demonstrates the differential effect of firm growth on sustainability, as in some contexts large firms can take advantage of their size to transfer resources away from sustainability, while in other contexts this might be seen as too threatening to their reputation and brand image. Similarly, the medium cap firms become less sustainable as they grow in the cases of Germany and the UK, however in the USA medium cap firms increase in sustainability as their firm size

increases. This is in line with the reasons given by Natarajan & Wyrick (2011) and the Center for Leadership in Global Sustainability (2014) who found that medium size manufacturers in the USA were able to improve their supply chain, their energy efficiency, and their relationships with their employees and suppliers which ultimately have influenced their sustainability positively. On the other hand, firms in Germany as well as the UK seem to demonstrate a transfer of firm resources from sustainability to profitability as they grow, driven especially in Germany by banks. The incentives for expanding businesses at this scale may be different between countries, particularly among family-owned firms. Expanding businesses, despite their increased market capitalization, require additional resources to finance this expansion which can put them under increased pressure from outside investors focused primarily on short-term returns. Moreover, the small cap firms in all countries of our study are more sustainable the bigger they get. This relationship is the strongest in the UK. Firms at this small scale likely see sustainability as a worthwhile investment in future profits, which the smallest firms cannot always afford. Based on our data, the question of how firms prioritize sustainability really only seems to emerge once firms have reached a certain level of market capitalization.

Banks in Germany, having a major stake in ownership of German firms, prefer short-term approaches to investment over long-term preferences for sustainability as compared to the major equity held by investment companies, mutual funds and insurance companies respectively in the USA and UK. Thus the new practical insights we gain from the present study is that within institutional ownership approaches to sustainability may vary depending on the preferences of the type of ownership concentration in firms. While sustainability may seem to be a worthwhile goal, its priority among firms waxes or wanes as the firm expands dependent on these preferences. And while large firms overall tend to show the greatest preference for sustainability, this preferences loses ground to other incentives as these firms grow in some cases, suggesting that, regarding sustainability, bigger is not necessarily better.

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