Ownership structure and firm performance: An empirical study of publicly listed firms in Germany

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ABSTRACT
This paper examines the impact of ownership structure on firm performance of publicly listed firms in Germany. An ordinary least square regression model (performed with robust standard errors) was applied to investigate the relationship. Firm performance was measured by the return on equity, return on assets and a market value measure, Tobin´s Q. The results do not show a significant linear relationship between ownership structure and firm performance. Nevertheless, institutional investors that hold a stake of the total shares, tend to have a significant positive relationship with Tobin's Q and a negative relationship with return on assets.

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1. INTRODUCTION

Corporate scandals have brought corporate governance weaknesses to the attention in the last several years. At the forefront are agency problems, which might cause a negative impact on the performance of the firm. Research has consistently shown that "corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment" (Schleifer and Vishny, 1997). Therefore, good corporate governance is not only essential in order to minimize agency costs, but also important in order to grow your business by attracting external financial investors. Ownership structure, a generic internal mechanism of corporate governance, has been researched in a plethora of literature to evaluate the relationship between ownership structures (for example, concentrated ownership) and firm performance, leading to inconclusive findings (Anderson and Reeb,2003; Hamadi and Heinen,2015). These differences in findings are due to multiple factors such as the use of different measures. Besides bias in the methodology a second major reason for the differences in research results is due to the impact of ownership concentration on firm performance being more complex than linear (Mazzi, 2011). As stated by La Porta, the legal system plays a defining role in understanding the ownership structure of a firm. Inadequate corporate governance structures and poor shareholder protection may result concentred ownership due to insufficient investment behaviour. It can be observed, that concentrated ownership is widespread in Continental Europe, while on the contrary, dispersed ownership tends to prevail in Anglo-Saxon economies.

Germany is the economic powerhouse of Continental Europe and it is further known to have many large organizations with concentrated ownership structures. It is identified as a bank-based system, in which companies are often compelled to seek use of banks for their financing (Naciri, 2008). As mentioned above the ownership structure of most German corporations tend to be concentrated and family ownership remains one of the dominant controlling shareholders. According to Ringe (2015): "Part of the reason for the dominance of concentrated ownership is that it has not been common for successful German firms to seek joining the stock market. Corporate finance has traditionally been dominated by a close relationship between the company and its longstanding partner bank." On the contrary, Ringe (2015) also argues that "corporate governance and corporate law are currently undergoing a major change." These changes affect in particular the concentration of ownership and the crucial role of bank influence. Whereas Germany was traditionally heavily dependent on bank financing, it makes nowadays more use of outside equity. Looking at the statistics of the Deutsche Bundesbank foreign investors, among others, are becoming the largest investors.

Although many studies have been conducted in other countries analysing the relationship between ownership structure and firm performance, this does not seem to be the case for German publicly listed firms. Most studies in this field have only examined the relationship between one shareholder group on firm performance. For instance, the study conducted by Andres (2008) focuses mostly on the relationship between founding-family ownership and firm performance. Therefore, this study aims to obtain data which will help to address this research gap in Germany.

The major objective of this study is to empirically investigate the impact of ownership concentration and different ownership identities like family, institutional and foreign ownership on firm performance of publicly listed firms in Germany in the time span of 2015 till 2017. This research aims to address the following research questions:

What is the impact of ownership structure on firm performance of publicly listed firms in Germany between 2015 and 2017?

Publicly-traded companies often have a wide range of different shareholder groups. Major investors tend to actively exert influence on the company. It is important not only to consider the ownership concentration, but also to take into account differences in identity. As different investor groups have different goals, subsequently they also have different influences on company performance (Thomsen and Pedersen, 2000).

The overall structure of this research takes the form of 6 sections, including the introduction. Section two examines the relevant theories like agency and stewardship theory and outlines the development of my hypotheses by taking a closer look into the different ownership structures. The third section will explain how the data was gathered for this study. The fourth section is concerned with the methodology used by this study, defining inter alia the dependent and independent variables. Section five presents and analysis the results. Section six offers a conclusion and suggestions for future research.

2. THEORETICAL BACKGROUND

2.1 Agency and Stewardship theory

Reviewing past literature, one of the main challenges corporate governance is facing, is called the "agency problem". The agency problem arises due to the transfer of power from the owner to the agent. This theory assumes, that mangers run the company in their own interest and do not act in the best interest of the owner (Christine Mallin, 2007). However, in this research it is important not only to look into the agency problem I, but also into agency problem II, whereas shareholder with a large stake may use its controlling position in the firm in the expense of smaller shareholders which have less control of the firm. Potential agency costs where ownership is concentrated may also occur, as a result of managers may act for the controlling shareholder, but not for the shareholders in general (Morck and Yeung, 2003). The conflict of interest becomes a problem due to information asymmetry between the principle and agent. Due to this information asymmetry the principle is at an informational disadvantage versus the agent increasing the likelihood of agency costs occurring. Information asymmetry can take place in two forms (Mallin, 2016):

Adverse selection (hidden knowledge): This type encompasses properties, that cannot be observed before the contract comes into effect. These properties can be both desirable or detrimental.

Moral hazard (hidden action): The agent is exposed to the possibility to act in a way, that is undesirable to the owner, which is caused by limited monitoring mechanisms and transfer of responsibilities. Furthermore, the agent can execute covert actions and decisions for the own benefit.

In contrast to the agency theory, the stewardship theory assumes that managers act as stewards, namely in the best interest of the company. Their sole objective is to create and maintain long-term success of the organization. „Stewardship theory defines situations in which managers are not motivated by individual goals, but rather are stewards whose motives are

aligned with the objectives of their principals“ (Davis et al., 1997).

The pursuit of stewardship can be easily recognized as a determinant of family firm superior performance and as a source of competitive advantage. In addition, the stewardship theory suggests that the existence of concentrated ownership restrains public corporation managers' behaviour and reduces information asymmetry (Krivogorsky and Burton, 2012).

2.2 Cost and Benefits of Concentrated Ownership

When looking at the Agency Theory we clearly recognize the need for a form of control within corporations. Without this control, firm value-maximization cannot take place. Therefore, we can clearly state that concentrated ownership has been identified as an influential mechanism of internal governance.
Traditionally, it has been argued that large shareholders overcome the free-rider problem and without a doubt mitigate the principal-agent problem (Jensen and Meckling, 1976; Schleifer and Vishny, 1986). Some studies reveal a non-linear relationship between concentrated ownership and firm performance. Nenova (2002) and Faccio and Lang (2002) point out that there are various methods in which shareholders can get access to excess control rights over cash flow rights. On the contrary, excess control rights enable potential wealth expropriation and may cause an information asymmetry between the controlling shareholders and minority shareholders (Nenova, 2002). Thomsen and Pedersen (2000) investigated the influence of ownership structure on company economic performance using a data sample of 2610 observations, leading to the conclusion, that concentrated ownership has a positive effect on the market-to-book value as on the return on assets to a certain point, "after which the incentive effect levels off", causing a bell-shaped effect. Another study conducted by Boone, Colombage and Gunasekarage (2011) suggests similar results, stating that large shareholders having a curvilinear firm performance relationship. Initial work in this field found a negative relationship. Schleifer and Vishny (1997) argue that shareholders owning a large stake may control the company effectively, but on the contrary, may misuse their power and harm minority shareholders.
As noted by Fama and Jensen (1985) dispersed ownership provides the shareholder with a greater portfolio variety diversification and reduced levels of unsystematic risk, contrasting concentrated ownership, which leads to high portfolio risk, yielding in a preference for low-risk low-return investments causing high risk-aversion behaviour. In addition, Demsetz and Villalonga (2001) report no significant relationship between ownership structure and firm performance, concluding that there is no performance difference between majority shareholders and diffused ownership. This finding corroborates the ideas of Welch (2003) who suggests that taking endogeneity into account, "ownership is not statistically dependent on the performance measure".

Germany follows a stakeholder governance, giving high priority to stakeholders and low minority protection. In the context of lacking external mechanisms and previous literature, it is most likely that large shareholders exploit their power at the expense of minority shareholder, increasing the risk of tunnelling. "Tunnelling" can be accomplished in various ways, such as through advantageous transfer of assets and profits out of the company for the benefit of the controlling shareholder and another example would be the transfer of excessive executive compensation or loan guaranties for other affiliated entities (Johnsen, La Porta, Lopez-de-Silanes and Schleifer, 2000).Thus, I formulate the following hypothesis:

H1: Ownership concentration has a negative relationship with firm performance

2.3 The influence of ownership identity on firm performance

While ownership concentration is being used to determine the power of different shareholders in regard to managerial influence, owner identity affects the method of power exertion and overall objectives, which on the other hand has implications to company strategy through defining and altering targeted profits and growth rates, dividends and capital structure (Thomsen and Pedersen, 2000). A fundamental assumption was made by Górriz and Fumás (1996, p.578) that „different ownership structures may result in different production possibility sets and performance", since different types of owners have different desires and interests (Thomsen et al.,2000). As was pointed out in the introduction to this paper, Germany is recognized as a bank-oriented system (Krivogorsky and Burton, 2012). Nevertheless, when looking at the statistics of the ownership structure of publicly listed companies in Germany, we clearly recognize, that the bank´s equity holdings steady decreased over the past years (Deutsche Bundesbank).
The changes underline the relevance of assessing the effect of different ownership identities, such as institutional investors, foreign investors and family ownership on general firm performance, leading to the extensive assessment in the following paragraph.

2.3.1 Family ownership

There is a large volume of published studies analysing the relationship between family ownership and firm performance, providing mixed results (Anderson and Reeb,2003; Andres,2008). An explanation for the lack of inconclusive findings might be due to the use of different depended variables as well as the description of family ownership lacks on an uniform definition. Looking at prior research papers there are more than 20 different explanations trying to define what we can consider as a family-owned business (Mazzi, 2011).
Family-governed enterprises can potentially outperform non-family-governed firms. This phenomenon can be explained by family members not acting in an opportunistic way and their inclination to pursue long-term orientation. Furthermore, they tend to resist the temptation of short-term gains as seen in non-family-governed companies, effectively eliminating the common principal-agent conflict (Miralles-Marcelo; Miralles-Quirós and Lisboa, 2014). Some other scholars, for instance Morck and Yeung (2003) find negative effects on family ownership and argue that this performance may decline as family members and managers may act for the controlling family and not in the best interest of all shareholders and "exchange profits for private benefits and forgo profitable projects" (Hamadi and Heinen, 2015). The Cadbury (2000) report advises family-owned firms "to recruit and retain the very best people for the business (..)" to avoid the risk of tunnelling and family entrenchment (Mercelo et al., 2014). A recent example of a family owned business, namely Volkswagen has failed to do so, by appointing the wife of a supervisory into a position within the organization without having the relevant skill set. Therefore, I suggest the following hypothesis:

H2: Family ownership follows an inverted U-shaped relationship with firm performance.

2.3.2 Institutional Ownership

The structure of ownership has changed during the past few years, especially as the role of institutional investors gained of importance, leading to an increased capability to make use of their influence and voting rights. Among domestic investors in Germany, institutional investors are by far the biggest investor group and capital investment of institutional investors has tripled since the 1990's, which has led to an increase the appeal of actively influencing the management of portfolio companies (Bress, 2008, Deutsche Bundesbank, 2014). Turning the focus to Germany, "institutional investors are the most important non-bank financial institutions" and "the major types of institutional investors in the German financial sector are insurance companies and investment funds" (Krahnen and Schmidt, 2004). Due to their expertise, know-how and financial resources they may have a greater incentive to monitor managers successfully and are in the better position to enhance good corporate governance (Cornett, Marcus, Saunders and Tehranian, 2007). Prior studies have noted the positive and important relationship between institutional ownership and firm performance. In contrast to concentrated ownership, institutional investors may also be less risk averse (Thomsen and Pedersen, 2000). Nevertheless, Schleifer and Vishny (1986) highlighted that large shareholders are expected to be more active in monitoring managers, than shareholders owning small stakes of the firm. According to Maug (1998), it is to a certain extent a function due to size of shareholdings, if corporate decisions are being influenced by institutions. High levels of institutional investor shareholdings cause shares to be less marketable and therefore tend to be held for extended timeframes, which leads to higher incentives to track and benchmark the managerial performance. This stands in contrast to cases in which only a few shares are held by institutional investors, as these are well positioned to liquidate their investments following subpar firm performance, eventually causing a lower incentive to track and monitor performance. In the same vein, Lin and Fu (2017) analysed the effects of institutional ownership on firm performance of listed firms in China and concluded that large institutional shareholders have a higher positive impact on firm performance compared to institutional investors holding a small stake of ownership. This indicates that shareholders size is an important feature considering the impact of ownership identity on firm performance. Regardless to the size, literature finds a positive relationship between institutional investors and firm performance and therefore, I suggest the following hypothesis:

H3: Institutional ownership has a positive effect on firm performance

2.3.3 Foreign ownership

"The term foreign-owned does not primarily imply that the owner is of a particular nationality, but that the owner is not of the nationality of the economy in consideration and therefore a stranger" (Gelübcke, 2012). Foreign ownership can be found not only in emerging markets but also in developed markets, like Germany. According to *Deutsche Bundesbank* in 2014, more than 57,1% of the listed firms in Germany are owned by foreign investors. Nevertheless, economies with active shareholder protection and "high quality accounting policies" (Aggarwal, Klapper, Wysocki, 2003) are in a better position to attract foreign investors. Foreign ownership seems to have a positive relationship with firm performance. It is argued that "companies with foreign corporate shareholdings are endowed with superior technical, organizational, and financial resources" (Douma, George and Kabir, 2006,). It can also be hypothesized that "companies with significant foreign ownership tend to have strong business links with their overseas investors which give them a competitive advantage in the market" (Dhar, 1988). Similarly, Conyon, Girma, Thompson and Wright (2002) conducted a research analysing the effects of take-over and merge activities on firm employment in the United Kingdom and found out that firms acquired by foreign ownership in the United Kingdom have an increase of 13 percent of labour productivity. Sarkar and Sarkar (2010) find a positive and significant relationship between foreign ownership and company value. They point out that a rise in foreign holdings increases the value of the company, implying that the extent of investment is more than 25 percent. Whereas other studies like Chhibber and Majumdar (1999) suggest a superior performance of foreign investors at ownership level holding more than 51 percent of the control rights. This leads us to the following hypothesis:

H4: Foreign ownership has a positive effect on firm performance

3. METHODOLOGY

3.1 Research Model

In order to investigate the extent of ownership structure on firm performance, an ordinary least square (OLS) regression on panel data, also known as cross-sectional time-series data will be applied. Being more precise, panel data are "observations on the same units in several different time periods" (Kennedy, 2008). According to Park (2011), this research uses an unbalanced short panel data, since this dataset includes a large amount of entities and only a few time periods (2015-2017). A regression model has been developed based on previous literature (Andres, 2008; Aluchna and Kaminski, 2017) to validate my first hypotheses, the regression model that will be used is:

Firm performance (ROA ,ROE, Q)$_{it}$ $= \alpha_0 + \beta_1(ownership\ conentration)_{it} + \beta_2(\ leverage)_{it} + \beta_3(size)_{it} + \beta_4(age)_{it} + \beta_5(year\ dummy) + \beta_6(industrydummy) + \varepsilon_{it}$

To test Hypothesis two till five, I will be using the following model:

Firm performance (ROA ,ROE, Q)$_{it}$ $= \alpha_0 + \beta_1(ownership\ identity)_{it} + \beta_2(\ leverage)_{it} + \beta_3(size) + \beta_4(age) + \beta_5(year\ dummy)_{it} + \beta_6(industry\ dummy) + \varepsilon_{it}$,

in which *i* refers to different firms and t to the time period, i.e. 2012-2017.

3.2 Variables

3.2.1 Dependent variables

The dependent variable used in this research is the financial performance of firms. The relationship between ownership structure and firm performance has been studied by many researchers all using different financial performance models. In addition, firm performance is lacking a uniform definition, causing the use of different models. Black and White (2003) argue that capital providers in Germany are more interested in balance sheet measures, in other words, book values are more value-relevant than

earnings. Therefore, this paper will focus on two financial performance measures as Andres (2008), Maury, B. (2006), among others: return on assets (ROA), return on equity (ROE), an accounting perspective and a market-to-book value, Tobin´s Q, which are calculated as follows:

$$Return\ on\ Assets = \frac{Net\ income}{total\ assets}$$

whereas, ROA is a measure of how profitable a business is relative to its assets,

$$Return\ on\ Equity = \frac{Net\ income}{total\ shareholder´s\ equity}$$

indicates the return made by the business for the shareholders with finance made available to the business by the shareholder (Alexander and Nobles, 2001) and

$$Q = \frac{(Market\ value\ of\ equity) + (Book\ value\ of\ total\ debt)}{(Book\ value\ of\ total\ assets)},$$

reflects the market value of the company. Although a strong correlation can be observed between accounting and market performance measures, we have to keep in mind that accounting performance measures are based on historical data and reflect past operating performance and market performance measures are forward-looking and reflect investor sentiment (Demsetz and Villalonga, 2001). To ensure the robustness of the performance measures, ROE and ROA will be additionally measured by earnings before interests and taxes (EBIT) divided by total assets.

3.2.2 Independent variables

Independent variables include concentrated ownership, family ownership, institutional ownership and foreign ownership. A variety of methods are used to assess ownership concentration. I will be using the method applied by Krivogorsky (2006), Aluchna and Kaminski (2017) and Thomsen and Pedersen (2000) by calculating the share of capital of block holders who hold at least 5 percent of the outstanding shares. Family ownership will be measured by computing the percentage of shares owned by a family. Following Lin and Fu (2017) institutional ownership will be defined by taking the percentage of common shares owned by institutional investors and the same method will be applied for defining foreign shareholdings (Douma et al., 2006).

3.2.3 Control variables

To obtain a more reliable outcome of this research, I will introduce control variables that have been identified in prior research (Hamadi and Heinen, 2015; Miralles-Marcelo et al., 2014; Douma et al., 2006; Krivogorsky, 2006) as having an impact on the dependent variable, firm performance. The three control variables are as follows: firm size, firm age and leverage.

Size may cause an ambiguous effect on firm performance, since it can have a negative but also positive impact. Fama and French (1995) argue, that smaller firms tend to have a lower return on equity compared to larger sized firms. In addition, large sized firms may enjoy economies of scale, since larger firms are expected to have more resources to spend, better technologies and be more diversified than smaller firms. On the contrary, large firms are dominated by bureaucracy and it is therefore more likely that they suffer from hierarchical managerial inefficiencies (Margaritis and Psillaki, 2009). Firm size is measures by the natural logarithm of the firm´s sales.

Another control variable we should take into account is Firm age. Older firms tend to be more stable due to the life stage that they are in and the experience that the age has brought them. This extra stability and experience could have a positive effect on firm performance. Older firms tend to be more rigid and less innovative than younger firms though and thus firm age has an ambiguous effect on firm performance. To ensure that firm age does not affect the outcome of the research undertaken in this paper it will be controlled for. Firm age is measured by the natural logarithm of the number of years since the firm´s incorporation (Douma et al., 2006).

The amount of leverage that a firm holds plays a major impact on its performance. Firms can increase their access to capital by increasing their leverage and thus take on more profitable projects. As the firm leverage rises the bankruptcy costs of an organization rise as well affecting the firm performance negatively (Krivogotsky 2006). It is therefore important that firms balance the lever of leverage within themselves. Literature further shows that different ownership structures hold on average different levels of firm leverage. To ensure that

Table 1. Variable definitions

Performance variables	
Return on Equity	Net income / Shareholders equity
Return on Equity EBIT	Earnings before interests, taxes / Shareholders equity
Return on Assets	Net income / Total assets
Return on Assets EBIT	Earnings before interests, taxes / Total assets
Tobin´s Q	(Market value of equity + Book value of total debt) / Book value of total assets
Ownership variables	
Concentrated ownership	Percentage of shares owned by the largest shareholder who holds at least 5% of the outstanding shares
Family ownership	Percentage of shares owned by family members
Institutional ownership	Percentage of shares owned by institutional investors
Foreign ownership	Percentage of shares owned by foreign investors
Control variables	
Leverage	Book value of total liabilities / Total assets
Size	Natural logarithm of Total Sales
Firm age	Natural logarithm of the number of years since the firm was founded

firm leverage does not affect the outcome of this study it will be controlled for. This will be done by taking firms book value of all long-term liabilities and dividing this by total assets.

It has been suggested to include industries as dummy variable using the two digit SIC-code (Miralles-Marcelo et al., 2014), since industries can have a direct impact on corporate ownership structures (Thomsen and Pedersen, 2000). To control for the three years chosen for my study, year dummies will be added as well.

4. DATA

The data sample includes all companies listed on the German Stock Exchange over the period from 2015 to 2017. This time span was chosen to provide a lately view of this subject. Financial information like total revenue, expenses, equity and debt will be collected from a financial database called Orbis (Bureau van Dijk). In order to classify the ownership structure, data is also collected from Orbis, in combination with manual collection from annual reports and company websites. Data with missing ownership will be deleted. I started with a data sample of 437 firms listed on the stock exchange, including the years I would have had a sample of (437x 3) 1311 firms. Nevertheless, after excluding several companies due to missing data like return on equity, Tobin's Q or ownership data my sample was reduced from 1311 firm year observations to a sample of 799 firm year observations.

5. RESULTS

5.1 Robustness Check

To ensure the robustness of the ordinary least square model, multiple robustness checks have to be applied, starting with the elimination of outliers. Outliers can have "an undue influence on calculations like means and squared differences from the mean, as in calculating standard deviations" (Burns and Burns, 2008). The data has been winsorized at the level of 2,5 % and 97 %. Additionally, autocorrelation may result biased estimates and therefore needs to be tested for, using the Durbin-Watson test. This test showed that the values were between 1.403 and 2.209, concluding that no autocorrelation is within this sample (Table 3). To test for heteroskedasticity, which causes standard errors to be biased, the Breusch-Pagan / Cook-Weisberg test was applied. This test suggests under the null hypothesis that the variance is constant. After conducting the Breusch-Pagan /Cook Weisberg test I was able to reject the null Hypothesis in most cases (Appendix 1). This means heteroskedasticity is present. "OLS regression assumes that errors are both independent of each other (absence of autocorrelation) and normally distributed. Using robust standard errors relaxes either or both of those assumptions" (Mehmetoglu and Jakobsen, 2016). Since heteroskedasticity occurs in our sample, robust standard errors tend to be more trustworthy and will be performed within OLS model (Krivogorsky and Burton, 2012, Mehmetoglu and Jakobsen, 2016). In order to identify multicollinearity in this study, a "Variance Inflation Factor" and a correlation matrix (shown in Table 3) for each variable was undertaken (O´Brien, 2007; Krivogorsky, 2006). The values of VIF should not exceed 10 otherwise this indicates multicollinearity. In the case of concentrated ownership and family shareholdings the test shows VIF > 16.64, implying serious multicollinearity.

5.2 Descriptive Statistics

Table one is providing an overview of the descriptive statistics. In case of a normal distribution, the mean and the median would be the same number. Since this is not the case and the mean and median values differ, the median is a better measure for the average of the dependent variables. ROE and ROA are slightly skewed to the left, while Tobin´s Q is slightly skewed to the right. This research shows, that ROA of German firms is on average 2,8% (3,8%) and ROE is on average 6,9% (9,6%). The Tobin´s Q has on average 1.903 (1.399). As was pointed out in the introduction to this paper, concentrated ownership seems to prevail in Continental Europe. This is in line with the findings, seeing that shareholders holding a large stake of the company is on average 29,9% (25,4%). Families hold on average even a larger stake of 37% (30,09%). "For most families it is reasonable to suppose that most of their wealth is

Table 2 Descriptive statistics

Variable	Mean	Median	Standard deviation	Minimum	Maximum	Number of observations
Dependent variables						
ROA %	0.028	0.038	0.1045	-0.862	0.227	796
ROE %	6.915	9.638	0.1919	-0.698	0.415	790
Tobin`s Q	1.903	1.399	1.411	0.735	7.59	799
Independent variables						
Ownership concentration (%)	0.299	0.254	0.224	0	0.95	640
Family shareholdings (%)	0.370	0.309	0.223	0	0.95	214
Institutional shareholdings (%)	0.378	0.322	0.242	0	0.87	158
Foreign shareholdings (%)	0,368	0,270	0,2734	0	0,97	184
Control variables						
Leverage	0.254	0.237	0.173	0	0.635	797
Size (log Sales)	12.59	12.37	2.619	7.343	17.89	798
Firm Age	57	49	53.62	9	269	798

invested in the company" (Andres, 2008) and as stated by Ehrhardt, Nowak and Weber (2004) "family ownership is not declining and remains very strong even for later generations." As mentioned by the Deutsche Bundesbank the number of institutional investors and foreign investors have steadily increased in the last couple of years. However, this is not surprising and can be also observed in the Table 2, since institutional investors hold on average 37,8% (32,2%) and foreign investors hold on average 36,8% (27%) of the total shares. Analyzing the control variables, it can be concluded that the leverage of German firms is on average 25,4% (23,7%). The average company in this research was founded 57 (49) years ago.

5.3 Bivariate Test

Table 3 illustrates the Pearson correlation among the variables used in this study. It is important to test for collinearity, due to the fact that it "can increase estimates of parameter variance; yield models in which no variable is statistically significant even though R^2 is large" (O´Brien, 2007). Not surprisingly, both accounting performance measures ROA and ROE show a strong positive correlation (0.8632). On the contrary, Tobin´s Q and ROA are negatively correlated (-0.002). This indicates an increase in ROA causes a decrease in the Tobin´s Q. Concentrated ownership and Family shareholdings have a strong positive correlation (0.8218). That was to be predicted, considering that most often family member are also the largest shareholders. This also applies for the positive correlation between concentrated ownership and foreign shareholdings (0.2156). Since the largest shareholder might also be a foreign investor. The negative correlation between institutional investors and concentrated ownership (-0.0592) and family shareholdings (-0.5763) was to be expected as family members or large shareholders are not institutional investors at the same time. It is noticeable that foreign shareholdings have a significant negative correlation with firm´s size, measured in sales (-0.4866). This may indicate that companies with foreign shareholdings have a lower level of sales and for that reason are smaller in size. Another explanation may be, that large companies do not like to be controlled by foreign investors. Firm size has a positive correlation with age (0.2965). These results suggest that firms have a tendency to grow as their age increases. Stulz (1988) points out that firms with a concentrated ownership structure hold more debt. Looking at the results, this might be the case, since concentrated ownership has the strongest positive correlation with leverage compared to the other ownership identities. After having conducted a Variance Inflation Factor measure and a correlation matrix which demonstrate strong correlation between certain variables, each model will be run separately to ensure significant results. This will be presented in the next section.

5.4 Multivariate tests

Table 3 presents the results of the ordinary least square regression (performed with robust standard errors) of the three different performance measures on ownership structures. The regression results show that all models are statistically significant based on the F-value which stays under the 5% level. In addition, the different ownership structures explain between 6,1% and 22,82% the variation in firm performance. The results show that the overall sample of the control variables, for instance leverage and size have a significant association with the performance measures. More specifically, size, measured in sales, is positively related to ROE and ROA and negatively related to Tobin´s Q. The relationship between size and Tobin´s Q is only in two models significant (see table 4). However, leverage is negatively associated with the ROA and in a few cases also negatively associated with the firm performance measure Tobin´s Q.

5.4.1 Regression results for concentrated ownership

The first regression model tested the effect of concentrated ownership on firm performance. As we can see, concentrated ownership has on the two performance measures, ROE (-2.445) and Tobin´s Q (-0.206) a negative impact and a positive effect on ROA (0.333). Nevertheless, it should be noted that these results are not significant, since the $p \geq 0.05$, concluding that a linear relationship does not exist in this case. For that reasons, the first hypothesis, which indicated a negative relationship between concentrated ownership and firm performance has to be rejected.

5.4.2 Regression results for family ownership

The second regression model was tested for the second hypothesis, which claimed to have an inverted U-shaped relationship between family ownership and firm performance. For the model to depict an inverted U-shaped relationship, the β coefficient for the linear variable, in this case FAM requires a significant and positive β and for the quadratic variable a significant and negative β (Haans, Pieters and He, 2016). However, the results reported in the second model indicate a U-shaped relationship for all three performance measures ROE, ROA and Tobin´s Q, since the linear variable, FAM (β for ROE= -1.454, β for ROA= -1.176 and β for Tobin´s Q= -1.087), claims a negative relationship and the squared variable FAM^2 (β for ROE= 10.18, β for ROA= 5.587 and β for Tobin´s Q= 1.285) a positive one. Given the fact, that these findings are not significant ($p \geq 0,05$), there is no evidence for an inverted nor U-shaped relationship between family

Table 3 Pearson correlations

	ROE	ROA	Tobin´s Q	CONC	FAM	INST	FOR	Lev	Size	Age
ROE	1.000									
ROA	0.8632	1.000								
Tobin´s Q	0.0953	-0.002	1.000							
CONC	-0.0335	0.0152	-0.0907	1.000						
FAM	0.1593	0.1551	-0.0819	0.8218	1.000					
INST	-0.0279	-0.0926	0.1277	-0.0592	-0.5763	1.000				
FOR	-0.0376	-0.0453	0.1158	0.2156	0.1405	-0.2741	1.000			
Lev	0.0521	-0.0204	-0.2203	0.0786	-0.0286	0.0489	-0.2076	1.000		
Size	0.2284	0.2277	-0.2246	0.1361	0.2573	0.2285	-0.4866	0.2545	1.000	
Age	0.0784	0.0913	0.0223	0.0840	0.0495	0.2231	0.0670	0.1418	0.0268	1.000

Table 4 Regression Results

	ROE				ROA				Tobin`s Q			
CONC	-2.445 (0.539)				0.333 (0.837)				-0.206 (0.365)			
FAM		-1.454 (0.925)				-1.176 (0.851)				-1.087 (0.341)		
FAM^2		10.18 (0.552)				5.587 (0.392)				1.285 (0.284)		
INST			-9.778 (0.144)				**-5.753** (0.009)**				**1.282*** (0.001)**	
FOR				10.09 (0.171)				3.328 (0.435)				-0.143 (0.639)
Leverage	-3.834 (0.486)	2.203 (0.739)	-11.77 (0.388)	-1.749 (0.877)	**-5.399*** (0.021)	**-8.488**** (0.009)	-7.067 (0.165)	-8.114 (0.175)	**-1.200**** (0.001)	**-1.825**** (0.003)	**-1.936***** (0.000)	**-1.744***** (0.001)
Log Size (sales)	**1.539***** (0.000)	**1.556**** (0.002)	**3.506***** (0.000)	**2.222**** (0.001)	**0.976***** (0.000)	**0.509*** (0.037)	**1.533***** (0.000)	**1.076*** (0.018)	**-0.064**** (0.003)	-0.041 (0.052)	**-0.110**** (0.003)	-0.033 (0.303)
Log Age	1.310 (0.086)	0.902 (0.530)	1.142 (0.548)	**4.228*** (0.014)	0.638 (0.053)	0.110 (0.847)	0.772 (0.226)	**2.339*** 0.012	**-0.179**** (0.001)	**-0.305**** (0.001)	**-0.295*** (0.022)	-0.099 (0.121)
Year dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industry dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Durbin Watson	1.848	2.045	1.433	1.759	1.731	2.113	1.403	1.668	1.919	2.209	2.076	1.950
Adjusted r^2	0.0845	0.0610	0.1323	0.0698	0.095	0.0892	0.1892	0.0626	0.1501	0.1907	0.2030	0.2282
F-value	0.0000	0.0000	0.0016	0.0072	0.0000	0.0000	0.0016	0.0051	0.0000	0.0000	0.0000	0.0000
N	625	213	158	181	631	213	158	183	633	212	158	183

Significance at the level 0.05 (*) 0.01 (**) 0.001 (***)

ownership and firm performance. In this context, hypothesis two needs to be rejected.

5.4.3 Regression results for institutional shareholdings

As can be seen in model 3, institutional investors tend to have a significant and positive influence on the Tobin´s Q (1.282). This variable explains with a percentage of 20,3 the variance in firm performance. On the contrary, institutional investors have a negative impact on the two accounting measures ROE (-9.778) and ROA (-5.753), whereas the negative impact of ROE is not significant and therefore does not predict a linear relationship between these two measures. Just taking the market value, Tobin´s Q into account, the third hypothesis, which suggests having a positive relationship between

institutional investors and firm performance confirms these findings. By contrast, institutional investors tend to have a negative influence on the ROA, causing a rejection of the third hypothesis.

5.4.4 Regression results for foreign shareholdings

The last model illustrates the results for foreign ownership and firm performance. Foreign ownership has a positive effect on ROE (10.09) and ROA (3.328) and does have a negative impact on Tobin´s Q (-0.143). In all three performance measures, the results are not significant. This means that there is no linear relationship, leading to the rejection of the last hypothesis, which claimed to have a positive relationship between foreign shareholdings and firm performance.

5.4.5 Additional robustness check

To ensure the robustness of the two performance measures ROE and ROA, this research performed an additional robustness check, by using an alternative definition of ROE and ROA, namely earnings before interest and taxes, instead of net income (see table 1). The findings of the second regression analysis, which can be found in the appendix, strengthened our analysis, since the results of the ownership structure did not change from a not significant to a significant relationship. However, most of the results became less negative / positive. For instance, the negative impact of institutional investors on ROA reduced from having a β = - 5.753 to a β = -0.043. The results of this study show that it is important to consider different definitions of measures as they may cause a significant impact on the outcome.

6. CONCLUSION

The major objective of this study was to investigate the impact of concentrated ownership and ownership identity on firm performance. A considerable amount of literature has been published on this topic, remaining contradictory findings. For example, Demsetz and Villalonga (2001) found no relationship between ownership structure and firm performance and on the other hand some researchers report that concentrated ownership has a negative impact on firm performance (Aluchna and Kaminski, 2017). The regression results in this study did not find a significant linear relationship between concentrated ownership and the three performance measures ROE, ROA and Tobin´s Q. Previous studies are in line with these findings, stating that concentrated ownership has a bell-shaped relationship (Thomsen and Pedersen, 2000). Andres (2008) analysed the relationship between large shareholders and firm performance of 275 firms listed on the German stock exchange, leading to the conclusion that concentrated ownership does affect firm performance adversely or does not have a detectable impact on firm performance. These findings are reasonable. Large shareholders owning a significant fraction of shares illustrates a direct economic incentive and may result a minimization of the information asymmetry, specifically the moral hazard effect. In general, it can be assumed, the smaller the discrepancies between the principal and the agent, the greater the effect on the financial performance of the company (Jensen and Meckling, 1976). On the contrary, previous literature argue, that besides the alignment of mutual interests and the reduction of the agent-principal problem, another problem may rise, called the entrenchment effect (Schleifer and Vishny,1997). This effect is further intensified when external mechanisms are missing. As with other large block holders, there is a risk that block holders will exploit their power and pursue their own interests, ignoring the interests of smaller shareholders (Schleifer et al., 1997). Even though, concentrated ownership can be seen as an internal control mechanism having a positive effect on firm performance, it can shortly after turn into a negative impact, causing a nonlinear relationship with firm performance.

The regression results on family ownership indicate no relationship between ROE, ROA and Tobin´s Q and family ownership, since the findings are not significant. Mixed results have been found on this relationship. Andres (2009) indicates a highly positive relationship between family ownership and firm performance, but only under certain requirements. If families only hold a large stake of the company, without being presented in the board, this superior relationship seems to diminish and does not differ from other companies. Krivogorsky and Burton (2012) show a positive relationship between family ownership and firm performance. In contrast, Morck and Yeung (2003) demonstrated a negative relationship, assuming that families hold a large stake of the total shares may not act in the best interest of all shareholders and may extract private benefits.

Institutional investors have a significant positive relationship on the Tobin´s Q and a significant negative relationship on the performance measure ROA. A recent review of the literature on this topic by Aluchna and Kaminski (2017) found also a negative significant relationship between institutional investors and return on assets. A reason for this might be that institutional investors are less interested in governing the firm when holding a small stake of the total shares.

The regression results of foreign ownership show no significant relationship between foreign ownership and firm performance. This study has not confirmed previous research in this field (Douma et al., 2006). Nevertheless, it has to be considered that most of this literature focus on emerging economies, therefore a one to one comparison cannot be made.

Summarizing the results to answer the research questions, this study was not able to find a strong and significant relationship between the ownership structure and firm performance on publicly listed firms in Germany.

7. LIMITATIONS AND FUTURE RESEARCH

Firstly, the winsorizing method can lead to biased results, since the true observed values are adjusted. Secondly, the sample size of the ownership identities, especially for institutional investors and foreign investors are small compared to other studies. Using a larger sample and a longer time period would provide more reliable results. As advised by Douma, George and Kabir (2006) it is important to distinguish foreign ownership, for instance into foreign investors and foreign corporations. This subdivision would have been helpful to get a better and deeper understanding of the relationship between certain ownership structures and firm performance, rather than computing the percentages of common shares owned by foreign investors in overall. Same for concentrated ownership. Future research should also analyse the non-linear relationship between concentrated ownership and firm performance, since this study did not find a significant linear relationship.

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9. APPENDIX

9.1 Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Model (1) CONC	Model (2) FAM; FAM^2
Ho: Constant variance	H0: Constant variance
chi2 (14) = 135.41	chi2 (15) = 121.16
Prob>chi2 = 0.0000	Prob>chi2 = 0.0000

Model (3) INST	Model (4) FOR
Ho: Constant variance	H0: Constant variance
chi2 (14) = 8.00	chi2 (14) = 11.76
Prob>chi2 = 0.0047	Prob>chi2 = 0.0006

9.2 Additional robustness check

Table 4

	ROE (EBIT)				ROA (EBIT)			
CONC	-0.0511 (0.418)				0.020 (0.186)			
FAM		-0.188 (0.448)				-0.042 (0.548)		
FAM^2		0.228 (0.314)				0.092 (0.215)		
INST			-0.066 (0.421)				**-0.043*** **(0.048)**	
FOR				0.002 (0.989)				0.0174 (0.727)
Leverage	-0.034 (0.802)	0.182 (0.156)	-0.008 (0.968)	-0.170 (0.494)	-0.052 (0.075)	**-0.096*** (0.012)	-0.013 (0.784)	-0.041 (0.555)
Size	**0.017*** (0.014)	0.009 (0.200)	**0.036***** (0.000)	**0.030**** (0.007)	**0.008***** (0.000)	0.001 (0.397)	**0.015***** (0.000)	**0.011*** (0.021)
Age	0.002 (0.922)	0.008 (0.350)	0.035 (0.162)	0.021 (0.520)	**0.008*** (0.021)	-0.009 (0.092)	0.016* (0.024)	**0.019*** (0.023)
Industry dummy	yes	yes	yes	yes	yes	yes	yes	yes
Year dummy	yes	yes	yes	yes	yes	yes	yes	yes
Adjusted r^2	0.0160	0.0099	0.2087	0.0641	0.0766	0,0892	0.2876	0.0650
F-value	0.0000	0.0000	0.0000	0.0002	0.0000	0.0027	0.0000	0.0159
N	623	213	158	181	629	213	158	183

Significance at the level 0.05 (*) 0.01 (**) 0.001 (***)