Influence of capital structure on firm´s financial performance: An Inter-Industry Investigation of German Listed Firms

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ABSTRACT,
This paper investigates the influence of capital structure on the firm performance of German public listed firms. A fixed effect regression model has been used on unbalanced panel data of all non-financial and non-governmental companies over the period 2012-2017. Capital structure was measured by the book values of short-term debt, long-term debt, and total debt. ROE, ROA and Tobin`s Q have been used as measures of firm performance. The findings show that on a country level, capital structure has a linear and positive influence on firm performance for the accounting-based measures ROE and ROA. The market, however, seems not to recognize this relationship. Furthermore, the study investigated the influence capital structure has on firm performance across the different industries and the results show strong evidence that this influence differs across the industries analyzed. This means that a general conclusion on a country level, without controlling for the different industries might be misleading and should therefore be avoided.

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Keywords
Capital structure, Financial performance, Inter-Industry, Fixed-effect model, Agency cost,

11th IBA Bachelor Thesis Conference, July 10th, 2018, Enschede, The Netherlands.

1. INTRODUCTION

Capital structure refers to the decision of corporations using a mix of securities and financing sources to finance its real investment (Myers, 2001). In short, capital structure refers to an assortment of a firm´s common equity, preferred equity, short-term debt and long-term debt. The topic of capital structure has received a lot of attention from finance scholars but so far, no consensus has been reached among researchers about an optimal capital structure.

The MM theorem developed by Modigliani and Miller (1958) laid the foundation for the research on the effect of capital structure on a firm´s value. They concluded that in a perfect capital market the value of a firm is only determined by its own assets, which implies that equity and debt act as perfect substitutes for each other. Therefore, capital structure decisions have no influence on the value of a firm. However, as soon as the assumption of a perfect capital market is relaxed, capital structure becomes an important factor for the value of a firm. Furthermore, evidence of Jensen and Meckling (1976), Myers (1984) and Stiglitz (1988) supported the research for new conceptual frameworks to describe the nature of the relationship.

Modigliani and Miller (1963) have shown that under imperfect capital market conditions, where interest expenses are tax-deductible, the value of a firm increases with higher financial leverage. This assumption, however, resulted in the idea that firms should mainly finance their investments by debt. Anyhow, increasing debt also results in an increased probability of bankruptcy which results in higher costs of debt. Therefore, the benefits of debt financing and the cost of leverage have to be balanced to find the optimal capital structure. Following this idea, Kraus and Litzenberger (1973) developed the trade-off theory, which offsets the benefits of debt, which arise from the tax shield by the direct and indirect bankruptcy costs that arise from increasing the debt. The theory suggests that an optimal capital structure exists. Until this point is reached, the benefits of the tax-shield outweigh the costs of debt and therefore capital structure has a positive effect on firm performance. However, a further increase of debt beyond the optimal point, leads to a negative effect on firm performance, since the costs of debt become higher than the benefits received from the tax-shield. Myers and Majluf (1984) conceived the pecking order theory that states that capital structure decisions follow a strict hierarchy. Due to the increasing information asymmetry, a company will first finance its operations internal, then debt is issued and only if no further debt can be issued, the firm starts to issue equity. The agency cost theory developed by Jensen and Meckling (1976), Jensen (1986) and Hart and Moore (1994) focuses on conflicts that arise between the principal, shareholders of a company, the agent, managers who operate the company on behalf of the principal and debt holders. An optimal capital structure, that maximizes the value of a firm is reached when the total agency costs are minimized. Jensen and Meckling (1976) argued that agency conflicts between the agent and principal influence the capital structure decisions, which in turn affects a company`s performance. Nevertheless, it is important to consider that no single theory alone can fully explain the relationship between capital structure and firm performance. Ardalan (2017) argues that the real society is extremely diversified and complex, whereas theories are always based on critical assumptions. Therefore, theorists are not always completely aware of the multifaceted society or tradition. Consequently, the correctness of theories regarding the effect of capital structure on firm performance may vary among different countries, given that these countries operate within a different context. This paper will focus on the agency cost theory and trade-off theory. The agency cost theory is used due to its ability to explain the influence of capital structure on firm performance. However, the agency cost theory predicts that the relationship between capital structure and firm performance is linear and even though many researchers support this assumption, research of Lin and Chang (2009) has provided evidence that the relationship is not in all cases linear. Since their findings are in alignment with the trade-off theory, the trade-off theory will also be considered.

The scope and importance of capital structure decisions are existentially high since it influences the value as well as the performance of a company and a mismanagement of capital structure could even lead to the bankruptcy of a company. Many researchers tried to investigate and explain the relationship between capital structure and firm performance (Abor, 2005; Tian and Zeitun, 2007; Ebaid, 2009; Lin and Chang, 2009; Margaritis and Psillaki, 2010; Gill et al., 2011; Umar et al. (2012); Stephen (2012); Vatavu, 2015; Le and Phan (2017)). Some researchers found a positive link between capital structure and firm performance (Abor, 2005; Gill et al., 2011; Margaritis and Psillaki, 2010; Le and Phan, 2017), whereas other researchers found a negative relationship (Tian and Zeitun, 2007; Umar, 2012; Stephen, 2012; Vatavu, 2015). Furthermore, Lin and Chang (2009) found that the relationship switches from positive to negative on a certain level of debt and finally, Ebaid (2009) found that there is a weak- to no relationship between capital structure and firm performance. As it can be seen, these results are contradicting, which means that more research has to be done to identify the "true" relationship between capital structure and firm performance.

Harris and Raviv (1991) found that firms operating in the same industry are more similar to each other than compared to firms in another industry. Furthermore, they observed that the relative leverage ratios tend to retain over time within an industry. Myers (1984) predicted, that since asset types, asset risks and requirements for external founds vary across industries, one could expect that industries also vary among the average debt levels. Michaelas et al. (1999), MacKay and Phillips (2005) and Degryse et al. (2012) found evidence, that industry characteristics have an influence on the capital structure of firms. The extent to which industry characteristics explain the variation of capital structure between firms is widely discussed. Balakarishnan and Fox (1993), stated that only 11% of the capital structure variation can be explained by differences between industries and 52% of the variation can be explained by firm effects.

Given the context, theories and empirical evidence that has been discussed above, the following research question and sub-questions have been developed:

What is the influence of capital structure on the financial performance of German public listed firms and does the relationship differ between industries?

1. What is the influence of capital structure on the financial performance of German public listed firms?

2. Is the influence of capital structure on firm performance linear or inverted U-shaped?

3. Does the influence of capital structure on the firm performance differ across industries?

The questions have been investigated using a fixed effect regression model on an unbalanced panel dataset of 463 German public listed companies over the time period 2012-2017. The results show that there is no evidence to support the argument that the influence of capital structure on firm performance is

inverted U-shaped. Furthermore, the results give strong evidence that the relationship is linear and positive for accounting measures of firm performance. Regarding market measures of firm performance, the regressions show that the market does not see a connection between leverage and firm performance. Finally, the results show that the influence of capital structure on firm performance differs across 8 industries analyzed.

This study is of importance and relevance for two different groups. For the academic world, this paper will provide further evidence on the journey to fully understand the relationship between capital structure and firm performance. Furthermore, it will act as a base for further research on the factor "industry" and the influence it has on the relationship. Then, this paper will provide support and advice for managers, shareholders, investors, debt holder and other parties whose knowledge in this domain is of importance for various decisions.

In the second section of this paper a theoretical framework concerning capital structure, firm performance and industries will be constructed based on literature and empirical evidence. In the third section, hypotheses will be developed. In section 4 the methodology that was used to answer the research question will be discussed. Section 5 provides information about the data collection and sample size. In section 6 the results of the analysis will be presented and discussed. A conclusion will be made in section 7.

2. LITERATURE REVIEW

2.1 Capital Structure

Capital structure is a mix of securities and financing sources used by corporations to finance real investments (Myers, 2001). Capital structure is a mixture of debt, preferred stock, and common equity used to increase capital. Firms must make investments in order to retain their operations and to achieve some growth. Equity is defined as a stock or any other security representing an ownership interest. Debt is defined as the borrowing of funds from individuals or financial institutions and involves the selling of bonds, notes, mortgages or other debt instruments. The maturity of those instruments classifies debt into two categories. If the maturity of debt is more than twelve months, as it is usual for loan and bond issues, it is classified as long-term debt. On the other side, if the maturity is one year or less, as notes usually have, debt is classified as short-term debt. In this paper short-term debt, long-term debt and total debt have been used in order to measure capital structure.

2.1.1 Modigliani-Miller Theory

The MM theory of Modigliani and Miller (1958), was the first theory that discussed the issue of capital structure. They stated, that in a perfect capital market, capital structure has no predictable material effect on corporate market values. This means that a firm´s value is determined by its own assets and not by the mix of equity and debt issued. This theory built the foundation for modern thinking and theories around capital structure. The perfect capital market, however, entails the following critical assumptions: no taxes, no transaction costs, no bankruptcy costs, companies, and investors have the same costs of borrowing, perfect availability of information for all investors and the markets are competitive. Following these conditions, capital structure has no influence on the value of a firm, since the benefits of using debt will be compensated by the decrease of company`s stock. Nevertheless, these assumptions cannot be held in the real market. In a subsequent paper, Modigliani and Miller (1963) realized their limitations and included taxes in their model. This means in an imperfect market interest expenses are tax deductible and therefore higher financial leverage will increase the value of a firm. However, this led to the unrealistic assumption that in order to increase the value of a firm, the company should be 99.99% financed by debt.
As it can be seen, by relaxing only one of the perfect capital market assumptions, capital structure plays an important role. Given, that in the actual market almost all of the assumptions cannot be held, it is evident that capital structure is important.

2.1.2 Trade-off Theory

The trade-off theory developed by Kraus and Litzenberger (1973) states that the capital structure of a firm is balanced between the benefits and costs related to debt. The trade-off theory defines how much debt and equity a company should use by balancing the benefits and costs (Frank and Goyal, 2009). The benefits of debt come through the tax shield (Modigliani and Miller, 1963), which means a firm is able to deduct tax liabilities by decreasing their income through interest rates. The costs of debt come through the increase of direct and indirect bankruptcy costs which result from an increase in financial risk (Kim, 1978). By balancing both, costs and benefits, an optimal capital structure exists. In short, the value of a firm with debt is equal to the value of a firm without debt plus the tax shield and after deducting financial distress costs. Before the optimal point is reached, debt has a positive effect on the value of a firm, since the benefits of the tax shield outweigh the costs of debt. Increasing the debt after the optimal capital structure has been reached, the effect of debt on the value of a firm becomes negative, since the costs of debt outweigh the benefits received from the tax shield. Therefore, the theory implies that the relationship between capital structure and the value of a firm is inverted U-shaped.

2.1.3 Agency cost Theory

Jensen and Meckling (1976), Jensen (1986) and Hart and Moore (1994) developed the agency cost theory, which mainly deals with the arising conflicts between shareholders, managers, and debt holders. The theory argues that the best mix of equity and debt, which maximizes the value of a firm, is the one that minimizes the agency costs. Jensen and Meckling (1976) stated that there are two types of agency costs. The conflict between managers and shareholders causes the agency cost of equity, which arises from the separation of ownership and control, whereas the conflict between equity holders and debt holders causes the agency cost of debt.
The agency cost of equity has been described in Jensen´s (1986) free cash flow theory. As Jensen and Meckling (1976) stated before, managers will act in their own self-interest and even though share-ownerships and compensation schemes can party align the interest of managers and shareholders, the complete alignment of the interests between those two groups is necessarily imperfect. With an excess free cash flow, managers have the opportunity to invest the money into non-profitable projects for their own goal instead of investing it in projects that increase the value of the firm and the shareholder´s return. The free cash flow theory (Jensen, 1986) argues that high debt can act as a corporate governance mechanism that forces managers to invest in profitable projects in order to create the cash necessary to pay the interest payments of debt. Therefore, for companies that have a high cash flow, increasing debt can reduce the agency costs and increase the value of a firm. Berger and Bonaccorsi di Patti (2006), Margaritis and Psillaki (2010), Gill et al. (2011) and most researchers share the opinion that an increase in debt can help to reduce the agency costs, due to constraining the managers

to act more in the interest of equity holders. Furthermore, Akintoye (2008) argued that acting in the interest of equity holders, will reduce inefficiency and therefore improve the performance of the company. However, on the other side, Stulz (1990) stated that the decrease in cash flow could result in less profitable investment opportunities compared to companies within the same industry that have a higher liquidity. Likewise, while debt can reduce the conflict and agency costs between shareholders and managers, it will increase the conflict and agency costs between shareholders and debtholders (Myers, 1977), since the risk of liquidation and underinvestment increases. With the increased risk, debt holders will be likely to increase the interest rates on the borrowings to compensate for the higher risk.

2.1.4 Industry effect on capital structure

An industry can be defined as a group of companies that share the same primary business activities. Single industries are typically named after their principal product, e.g. auto industry. Industries are being categorized for statistical use, according to uniform classification codes like the Standard Industrial Classification (SIC). Research in the field of industry effects on the capital structure of firms mainly distinguishes between inter-industry and intra-industry effects. While research on inter-industry effects strives to answer to what extent capital structure variation between firms can be explained by industry characteristics, research on intra-industry effects, deals with the question to what extend firm effects can explain the variation of capital structure between firms. Balakrishnan and Fox (1993) found, that 11% of capital structure variation can be explained by inter-industry differences and 52% can be explained by firm effects. Similar percentages were found by MacKay and Phillips (2005). The effect of firm-specific effects on capital structure decisions, raises from the idea, that firms will act differently, even though they are operating in the same context. According to Degryse et al. (2012), industry competition, the heterogeneity in employed technology and the degree of agency conflicts are factors that can partly explain this behavior. However, this study did not focus on the intra-industry effect on capital structure, since the accessibility of necessary data was too limited for an extensive analysis. Therefore, this paper will only focus on inter-industry effects on capital structure decisions of firms. The trade-off theory states that the optimal leverage ratio that firms are targeting, might be different across industries. This is in alignment with the findings of Michaelas et al. (1999), who found that industry fixed effects have an impact on the capital structure. Furthermore, research of Degryse et al. (2012) found additional evidence that industries influence capital structure decisions within an industry and that those decisions vary across industries. To be more specific, they found that total-debt, long-term debt, and short-term debt differs significantly between all industries tested.

2.2 Performance

According to Tian and Zeitun (2007), performance is closely linked to capital structure. However, it is not possible to find a consensus in the literature about how firm´s financial performance should be defined (Kirby, 2005). The definition and measurement of financial performance are debated to such an extent since different stakeholders require different indicators of financial performance in order to make thoughtful decisions. Ratios to measure performance are mainly classified into two groups, namely profitability ratios, which are also named accounting ratios and market ratios (Masa`dhe et. al., 2015). Return on assets (ROA) and return on equity (ROE) are commonly used accounting measures for firm performance (Tian and Zeitun, 2007; Ebiad, 2009; Gill et al., 2011; Umar et al., 2012; Stephen, 2012; Vatavu, 2015 and Le and Phan, 2017). ROA measures the operating performance of a firm, relative to the investments made, without considering the financing source (Stickney, 1996). ROE indicates the success or failure of management to maximize the investment of stockholders in the firm, in the form of return. (Alexander and Nobes, 2001). Nevertheless, these measures have limitations. First, accounting measures are highly dependent on accounting standards. Secondly, these measures rely on the past, rather than focusing on the future and thirdly, the measures are prone to human error. To limit the influence of these factors, only companies of Germany have been taken into account, in order to illuminate the possibility that different accounting standards could influence the analysis and secondly, outliers, which might exist due to human failure were winsorized at 2.5% and 97.5%. Nevertheless, Miller (1987) argued that accounting measures are not always reliable, due to the possibility that owners and managers could have manipulated the numbers. To account for this possibility, an additional market measure was used. According to Sauaia (2002), Tobin`s Q is a reliable measure, which reflects the past as well as takes future market expectations into account. Tobin`s Q was also used in the studies of Nigel and Sarmistha (2007) and King and Santor (2008). To conclude, in order to reflect internal and market developments, ROA, ROE and Tobin`s Q have been used to measure performance.

2.3 Empirical evidence

The influence of capital structure on firm performance has been subject to a large amount of research. A summary of the research of Abor (2005), Tian and Zeitun (2007), Ebaid (2009), Lin and Chang (2009), Margaritis and Psillaki (2010), Gill et al. (2011), Umar et al. (2012), Stephen (2012), Vatavu (2015) and Le and Phan (2017) can be found in the appendix, table 7. The table provides an overview of the dependent, independent and control variables used, their findings, the sample size, time-frame, and countries analyzed.

As it can be seen, the results are contradicting. On one side, some researchers (Abor, 2005; Margaritis and Psillaki, 2010; Gill et al., 2011 and Le and Phan, 2017) found a positive relationship between capital structure and firm performance, whereas on the other side researchers (Tian and Zeitun, 2007; Umar, 2012; Stephen, 2012; Vatavu, 2015) found that the relationship is negative. Moreover, Lin and Chang (2009) provided evidence that the relationship is not linear and switches from positive to negative on a certain level of debt. Finally, Ebaid (2009) found that there is a weak- to no relationship.

Furthermore, it can be seen that short-term debt (STD), long-term debt (LTD) and total debt (TD) are the most chosen variables among the researchers for measuring the independent variable capital structure. ROE and ROA are mainly chosen as accounting measurements for firm performance and Tobin`s Q is chosen as a market measurement for firm performance. Finally, tangibility, risk, asset growth, sales growth, and size are most often used as control variables.

3. HYPOTHESIS

Based on theories and empirical evidence, hypotheses have been developed in order to answer the research question and sub-questions. First, the trade-off theory and the possibility of a non-linear relationship between capital structure and firm performance has been considered. Secondly, the agency theory has been discussed including its implications for firm

performance. Finally, the industry factor and its influence on the relationship was examined.

The trade-off theory argues that debt can increase the performance of a company through the tax shield up to a certain point, where the optimal capital structure is reached. Increasing leverage beyond that point would lead to a negative effect on firm performance since the direct and indirect bankruptcy costs would outweigh the benefits of the tax shield. This means the trade-off theory implies that leverage has first a positive effect on firm performance and if the debt ratio becomes too high, the effect becomes negative. This is in alignment with findings of Lin and Chang (2009).

Hypothesis 1: The relationship between capital structure and firm performance of German public listed firms is inverted U-shaped.

The agency cost theory (Jensen and Meckling, 1976; Jensen, 1986 and Hart and Moore, 1994), discussed in section 2.1.3 argues that increasing debt could lead to two possible conflicts that have counteracting influences on the performance of a company. First, since public firms always have a separation between ownership and management, an increase in debt should have a positive influence on firm performance. The second outcome is that due to less profitable investment opportunities and higher agency costs between shareholders and debt holders, an increase in debt would decrease the firm performance.

Empirical evidence supports both possible outcomes. However, a negative influence of leverage on firm performance was found more often in emerging economies like Jordan, Ghana, South Africa and India (Majumdar and Chhibber, 1999; Tian and Zeitun, 2007) and a positive influence has been monitored more frequently in developed economies like studies have shown from France and the United States (Margaritis and Psillaki, 2010; Gill et al., 2011). With a GDP of 3,652 billion USD in 2017, Germany is the fourth largest economy in the world. Consequently, a positive effect is assumed.

Hypothesis 2: Leverage has a positive influence on the performance of German public listed firms.

Finally, Michaelas et al. (1999) and Degryse et al. (2012) found that industry fixed effects have an impact on the capital structure of firms and differ among industries. Michaelas et al. (1999) found that 8 out of 8 industries tested have a significantly different capital structure than the industry Agriculture, Forestry, Mining. Due to these findings, one can predict that these different capital structures will also interact differently with the firm performance. Following this assumption, it is predicted that industry effects influence the capital structure decisions of German public firms and thus, the influence capital structure has on firm performance differs among the industries.

Hypothesis 3: The influence capital structure has on firm performance differs across the different industries.

4. METHODS

4.1 Variables

Three response variables have been used to measure firm performance: ROE, ROA and Tobin`s Q. Total debt, long-term debt and short-term debt were used as explanatory variables for capital structure. Following the literature, reported in the appendix, table 7, risk, tangibility, sales growth, asset growth, and size have the strongest influence on firm performance and were therefore used as control variables. A description of all variables used in this study can be found in table 1.

4.1.1 Performance variables

In order to measure the financial performance of a firm, ROE, ROA and Tobin`s Q have been used. Return on Equity and Return on Assets are accounting ratios that have often been used in the literature as measures for firm performance (Abor, 2005; Ebaid, 2009; Gill et al., 2011; Vatavu, 2015). Tobin`s Q is a market ratio that reflects past events and future market expectations and was used in several studies (Tian and Zeitun, 2007; Lin and Chang, 2009; Le and Phan, 2017. However, it is not possible to find an agreement in the literature about the measurement of ROE and ROA. Some researchers use earnings before interest and taxes (EBIT), like Umar et al. (2012), whereas other researchers, like Tian and Zeitun (2007) and Margaritis and Psillaki (2010) use Net Income. EBIT refers to the Operating Profit and is calculates as revenue minus expenses, while taxes and interests are excluded. The difference between Operating Profit and Net income is, that for Net Income the interest and taxes are also being deducted from the revenue and gives, therefore, the total profit of a company. For the reason of

Table 1 Variable definitions and abbreviations

Return on Equity NI (ROENI)	Net income / Shareholders equity
Return on Equity EBIT (ROEEBIT)	Earnings before interests, taxes / Shareholders equity
Return on Assets NI (ROANI)	Net income / Total assets
Return on Assets EBIT (ROAEBIT)	Earnings before interests, taxes / Total assets
Tobin´s Q	(Market value of equity + Book value of total debt) / Book value of total assets
Book value short term debt (STD)	Short-term debt / Total assets
Book value long term debt (LTD)	Long-term debt / Total assets
Book value total debt (TD)	Total debt / Total assets
Risk (RK)	SD (Net income / Total assets) for four years
Tangibility (TAN)	Tangible fixed assets / Total assets
Growth in assets (GA)	Total assets of time t / Total assets of time t-1
Growth in sales (GS)	Operating revenue of time t / Operating revenue of time t-1
Size (SZ)	Natural log of Total assets of 4 years

simplicity, Net Income was used in the main analysis, whereas EBIT was used for the robustness check. Thus, ROE is calculated as Net Income divided by total shareholders' equity for each year and ROA is calculated as Net Income divided by total assets for each year. Furthermore, following the approach of Kabir (2006), Tobin`s Q is calculated as the sum of the market value of equity and book value of debt divided by the book value of total assets for each year.

4.1.2 Capital Structure variables

The explanatory variable capital structure was measured by short-term debt, long-term debt, and total debt. This is in accordance with most of the literature (Abor, 2005; Tian and Zeitun, 2007; Ebaid, 2009; Gill et al., 2011; Umar et al., 2012; Vatavu, 2015; Le and Phan, 2017). Each of these ratios can be determined using the market value, book value or both values (Frank and Goyal, 2009). Due to data limitations, this research has only taken the book values of leverage into account. This is in alignment with the studies of Abor (2005), Ebaid, (2009), Margaritis and Psillaki (2010) and Gill et al. (2011). Therefore, leverage in this study was measured as the ratios of the book value of short-term debt to the book value of total assets (STD), book value of long-term debt to the book value of total assets (LTD) and book value of total debt to the book value of total assets (TD).

4.1.3 Control variables

Risk, tangibility, growth in sales, growth in assets and size are the five most often used control variables in similar studies (Tian and Zeitun, 2007; Lin and Chang, 2009; Margaritis and Psillaki, 2010; Vatavu, 2015; Le and Phan, 2017) and are expected to have an influence on the financial performance of companies. Therefore, these control variables were also used in this study. Risk is expected to have a negative influence on firm performance since higher risk is associated with higher financial distress costs which will diminish the performance of a firm (Tian and Zeitun, 2007). Furthermore, Bloom and Milkovich (1998) stated that high business risk will make it more difficult for firms to plan future actions and formulate strategic plans, thus influencing the performance negatively. Risk was measured as the standard deviation of the ratio of net income divided by total assets (Titman and Wessels, 1988). 4 years have been considered when calculating the standard deviation. According to Margaritis and Psillaki (2010), tangibility is measured as the ratio of tangible fixed assets to total assets. Himmelberg at al. (1999) argued that tangible assets can be easily monitored, act as securities and thus lower agency conflicts. Growth in sales is measured as operating revenue of time t divided by operating revenue of time t-1 (Akguc et al., 2015). Growth in assets measures the annual growth rate of assets and is calculated as total assets of time t divided by total assets of time t-1 (Salim, 2012). Both growth in sales and growth in assets can be seen as proxies for growth prospects (Margaritis and Psillaki, 2010). Furthermore, growth is expected to influence firm performance positively, since a high growth rate means that the firm is able to create more value and profit from its investment opportunities (Le and Phan, 2017). Finally, size was measured as the natural log of total assets. (Salim, 2012). The literature is contradicting regarding the effect of size on firm performance. On the one side, larger firms are expected to be more diversified and better managed (Margaritis and Psillaki, 2010) which should increase the firm performance. Furthermore, in comparison to small companies, large companies have an easier access to the market and are able to borrow at better conditions (Ferri and Jones, 1979). On the other side, large firms may suffer from higher monitoring costs and hierarchical managerial inefficiencies, resulting in a lower performance (Williamson, 1967).

4.2 Model

To understand the influence of capital structure on firm performance, a multiple regression analysis was undertaken on cross-sectional time-series data. To be more specific, the study used unbalanced short panel data, meaning the dataset included a large number of entities (n = 463) but only a few time periods (t = 6) and not all entities have the same amount of time-observations. According to Hsiao (1986) panel data has some advantages over conventional time-series or cross-sectional data sets for economic research. It improves the efficiency of econometric estimates since panel data commonly provides a large number of data points which reduces the collinearity among explanatory variables and increases the degrees of freedom (Hsiao, 1986). Furthermore, according to Baltagi (1995), panel data is better able to identify and measure effects that pure cross-sectional or pure time-series models are not able to detect, and panel data can better study the dynamics of adjustment.

The general research model that has been used to answer the hypotheses can be specified as:

$$PERF_{i,t} = \beta_0 + \beta_1 LEV_{i,t-1} + \beta_2 Z_{i,t-1} + \alpha_1 + ui_{,t},, \quad i = 1 \ldots N \quad and \; t = 1 \ldots 6$$

Where, $PERF_{i,t}$ represents the performance measures, ROE, ROA and Tobin`s Q; $LEV_{i,t}$ is a vector of the different explanatory variables, short-term, long, term and total debt to book value of total assets and $Z_{i,t}$ is a vector of control variables, which does not have an intercept term. Furthermore, α_i represents the firm-specific intercept that captures firm-specific factors that are difficult to measure. In order to resolve endogeneity problems, the explanatory variables have been lagged one year behind the dependent variable (Brav, 2009).

In order to test the first hypothesis, namely, if the influence of capital structure on firm performance is inverted U-shaped, the quadratic specification $\beta_2 * LEV^2_{i,t-1}$ has been included in the regression model (Margaritis and Psillaki, 2010). This means, that at a sufficiently high level of leverage, the effect of leverage on performance may reverse and become negative. For the values of $LEV < -\beta_{1/2}\ \beta_2$, leverage will have a negative effect on performance. $\beta_2 < 0$ is a sufficient condition to hold for the inverse U-shaped relationship between leverage and performance. The regression was carried out by analyzing the whole panel dataset.

Hypothesis two has been tested using the general regression model as it is presented above, including all firm-year observations of the dataset.

Finally, for testing the third hypothesis the general regression model was used for each of the 8 industries separately. All regressions and analyses have been carried out using the statistical software Stata.

Since panel data was used for the analysis, the use of variable-intercept models that introduce time and/or type-specific effects into the regression that avoid or reduce the omitted variables bias was permitted (Hsiao, 1986). The use of variable-intercept model estimations often brings up the question of the individual effects are being "random-effects" or "fixed-effects". Since the study considered all ten industries of Germany, it cannot be said that the industries in the sample are a small sample of a much larger population of industries (Michaelas et al., 1999). Therefore, the fixed-effects model would be more useful than the random effect

model. Furthermore, the Hausman test has been performed for the general model and the general model including the quadratic specification. The null hypothesis has been rejected in both cases, supporting the use of a fixed-effect model. The main assumption of the fixed-effect model is, that the individual specific effect is correlated with the independent variables (Greene, 1991). From a logical perspective, it also makes sense that firms have specific abilities, structures, operation practices etc. that affect the capital structure and therefore the performance.

Furthermore, both models had to be tested for autocorrelation and heteroskedasticity, since running the regression without considering these influences could lead to invalid results and wrong conclusions. Autocorrelation means that the standard error of one-time period is correlated with the standard error for a subsequent time period. On the other side, heteroskedasticity refers to the situation in which the size of the error term (standardized residuals) differ across values for an independent variable. In order to control for autocorrelation and heteroskedasticity, the Wooldridge´s autocorrelation test and the Wald test for group-wise heteroskedasticity in fixed effect regression models have been carried out for each model. The results show, that for both tests, H0 was rejected, meaning that autocorrelation and heteroskedasticity are present. In order to remove the autocorrelation and heteroskedasticity effect, the models have been adjusted, meaning for the regression analyses, robust standard errors have been used instead of standard errors. Robust standard errors resolve the problems and therefore the test results are more reliable and accurate.

5. DATA

In order to create a dataset, secondary data of German public listed firms was obtained from the database ORBIS. The database was provided by Bureau van Dijk (BvD) and covers data from large and very large companies around the world. ORBIS stores data up to 10 years, which covers the time period of 2008-2017. Consequentially, this time period was used for the analysis. However, only the data from 2012-2017 could be utilized in the analysis, since calculating the control variable risk, required 4 years of data and lagging the independent and control variables one year behind the dependent variable reduced the time period by another year. Nevertheless, the period was considered as long enough to provide sufficient data to test the strength and direction of the relationship between capital structure and firm performance. Only considering firms that were still listed at the end of 2017 would have distorted the results. Therefore, public listed firms, as well as public listed firms that have been delisted in the time period, have been considered. All companies have been classified according to the Standard Industry Classification (SIC) codes. Next, companies operating in the financial industry (SIC 6000-6999) and governmental sector (SIC 9000-9721) have been excluded, since the financial statements of companies operating in these industries differ significantly from companies operating in a different industry due to governmental regulations (Pandey, 2001; Basil and Khaled, 2011). Furthermore, firms that did not satisfy the German auditing requirement of having 6 million euros in total assets for two consecutive years have been removed. Finally, firm-year observations that did not provide sufficient information regarding the dependent or independent variables have been removed. This resulted in a sample size of 463 companies and 2411 firm-year observations. Clearing the data was done by winsorizing the data at 2.5% and 97.5%. This is in alignment with the study of Akguc et al. (2015) and should reduce the effect of outliers.

Table 2 Descriptive statistics

Variable	Mean	Median	Standard deviation	Minimum	Maximum	Number of observations
Dependent variables						
ROENI	0.040	0.084	0.246	-0.904	0.497	2341
ROEEBIT	0.105	0.132	0.276	-0.893	0.744	2341
ROANI	0.016	0.033	0.108	-0.401	0.207	2407
ROAEBIT	0.040	0.055	0.110	-0.366	0.243	2407
Tobin`s Q	1.645	1.301	1.049	0.677	5.638	2219
Independent variables						
STD	0.289	0.264	0.154	0.033	0.693	2411
LTD	0.247	0.226	0.173	0.001	0.679	2411
TD	0.539	0.538	0.216	0.094	1.000	2411
Control variables						
RK	0.059	0.027	0.082	0.003	0.388	2230
TAN	0.224	0.183	0.197	0.001	0.753	2411
GA	1.061	1.039	0.171	0.708	1.634	2358
GS	1.069	1.044	0.238	0.517	1.939	2340
SZ	12.446	12.101	2.231	9.069	17.773	2411

Notation: Variable definitions see table 1

6. RESULTS

6.1 Descriptive statistics

Table 2 presents an overview of the descriptive statistics. In comparison to the independent variables, it can be seen that the dependent variables show a skewness. This means the mean differs from the median. Therefore, the median is, in this case, a

better predictor for the measures of firm performance, since the median is less sensitive to outliers. ROE measured by NI is positive being 4 (8.4) percent while being 10.5 (13.2) percent measured by EBIT. The average of ROA for the whole sample is 1.6% (3.3%) measured by NI and 4% (5.5%) when measured by EBIT. Consequentially is ROA on average smaller than ROE. This was also found by Akguc (2015) and Umar (2012). The market performance measure Tobin´s Q is on average 1.645 (1.301). As stated before, it can be observed that Tobin´s Q, ROANI, and ROENI have a large spread in their values. Especially ROANI and ROENI, ranging from -40.1% to 20.7% and -90.4% to 49.7%. Following Le and Phan (2017), this implies that there exists a significant gap in firm performance among German public listed firms for the period analyzed. The average of the total book value of debt is 53.9%, meaning that on average half of the firm's operations and growth is financed by leverage. This is in alignment with the findings of Le and Phan (2017) and Degryse et al. (2012) but significantly higher than 22%, observed by De la Bruslerie and Latrous (2012) for French companies. Even though values of TD range from 9.4% to 100%, the median of 53.8% shows, that TD is not significantly dispersed. Furthermore, it can be observed that the mean of STD is 28.9% and only slightly higher than the mean of LTD, which is 24.7%. This could indicate that German public firms try to balance their leverage by using both short-term debt and long-term debt in the same amount.

Table 3 Kendall`s Tau correlation matrix

	ROENI	ROANI	Tobin´s Q	ROEEBIT	ROAEBIT	STD	LTD	TD	RK	TAN	GS	GA	SZ
ROENI	1.00												
ROANI	0.71*	1.00											
Tobin´s Q	0.24*	0.25*	1.00										
ROEEBIT	0.68*	0.49*	0.20*	1.00									
ROAEBIT	0.60*	0.73*	0.27*	0.66*	1.00								
STD	0.08*	-0.03	0.04	0.13*		1.00							
LTD	0.05*	-0.08*	-0.14*	0.15*		-0.10*	1.00						
TD	0.09*	-0.13*	-0.08*	0.21*	-0.05*	0.39*	0.50*	1.00					
RK	-0.13*	-0.15*		-0.20*	-0.20*	0.03	-0.13*	-0.06*	1.00				
TAN	-0.03	-0.05*	-0.17*	0.03		-0.12*	0.32*	0.16*	-0.12*	1.000			
GS	0.11*	0.13*	0.12*	0.12*	0.15*			-0.03	-0.07*	-0.06*	1.00		
GA	0.14*	0.16*	0.12*	0.12*	0.16*			-0.04*	-0.10*	-0.08*	0.33*	1.00	
SZ	0.13*	0.09*	-0.06*	0.15*	0.10*	0.07*	0.22*	0.20*	-0.28*	0.15*		0.07*	1.00

Notation: Variable definitions see table 1; Correlations shown at the 0.1 level; Significant at the 0.01 level *

6.2 Bivariate correlation

In order to test the bivariate correlation of the variables included in the model, Kendall`s tau correlation matrix was constructed. Kendall`s tau was preferred over Pearson`s correlation since Pearson`s correlation has the underlying assumption that the variables are linear correlated. Since this study also investigated the possibility that the variables are correlated in a non-linear way, Kendall`s tau correlation is more appropriate. Table 3 reports the Kendall`s tau correlation matrix. Only correlations with a significance of 10% and higher have been reported in the table and very meaningful correlations, with a p-value lower than 0.01, have been marked with a star. As expected, the three performance measures ROENI, ROANI, Tobin´s Q and the two performance measures for the checking the robustness of the model ROEEBIT and ROAEBIT are highly correlated. Interesting is, that STD and LTD are only weakly correlated with ROENI, given the values of 0.08 and 0.05. Furthermore, both variables are not significantly correlated with ROAEBIT. Moreover, STD and LTD are negatively correlated with a value of -0.10. STD, LTD, and TD have all a positive correlation with ROENI and are negatively correlated with ROANI. STD has a positive correlation with Tobin´s Q, whereas LTD and TD have a negative correlation. Important is that TD and LTD have a high correlation as well as TD and STD. This could lead to a multicollinearity problem which would result in insignificant results. Therefore, it was decided that each regression analysis would run separated for each independent variable in order to prevent the influence of multicollinearity on the regression results.

6.3 Multivariate analysis

6.3.1 Inverted U-shaped relationship

In order to determine if the relationship between leverage and firm performance is inverted U-shaped, tests were conducted. Margaritis and Psillaki (2010) and Berger and Bonaccorsi di Patti (2006) supported the use of the quadratic function implemented in the Model to allocate non-linear relationships. The results of the regression are reported in table 4. As it can be seen from STD and STD2, the coefficients change from positive to negative on a certain level, when measuring ROE and Tobin`s Q. This indicates that the effect of STD on ROE and Tobin's Q is positive while STD is low. However, on a certain level of STD, the relationship would become negative. The same occurs for LTD and LTD2 while measuring ROA and Tobin`s Q. As the results show, for TD and TD2, it would be the other direction.

Table 4 Regression results for inverted U-shaped relationship

	Tobin`s Q			ROANI			ROENI		
STD	0.337			0.023			0.340		
	(0.38)			(0.21)			(1.12)		
STD2	-0.794			0.145			-0.333		
	(-0.62)			(1.10)			(-0.71)		
LTD		1.408			0.094			0.213	
		(1.61)			(0.95)			(0.78)	
LTD2		-1.648			-0.014			0.549	
		(-1.50)			(-0.10)			(1.22)	
TD			-0.136			-0.045			-0.127
			(-0.15)			(-0.38)			(-0.37)
TD2			0.226			0.173			0.614
			(0.33)			(1.83)			(1.92)
RK	-0.882	-0.930	-0.972	-0.049	-0.013	-0.044	-0.129	-0.028	-0.182
	(-1.89)	(-1.96)	(-2.09*)	(-0.79)	(-0.20)	(-0.72)	(-0.74)	(-0.17)	(-1.07)
TAN	-0.846	-0.934	-0.851	-0.011	-0.051	-0.063	-0.104	-0.307	-0.254
	(-2.72**)	(-2.81**)	(-2.46*)	(-0.20)	(-0.93)	(-1.17)	(-0.74)	(-2.33*)	(-1.75)
GA	0.034	0.019	0.030	0.027	0.024	0.024	0.065	0.049	0.056
	(0.22)	(0.13)	(0.20)	(1.59)	(1.49)	(1.49)	(1.38)	(1.09)	(1.22)
GS	0.016	0.003	0.012	0.012	0.014	0.011	0.024	0.024	0.014
	(0.23)	(0.04)	(0.17)	(1.36)	(1.53)	(1.23)	(0.79)	(0.84)	(0.50)
SZ	0.293	0.289	0.302	-0.040	-0.043	-0.037	-0.150	-0.152	-0.135
	(2.02*)	(2.00*)	(2.10*)	(-2.48*)	(-2.73**)	(-2.41*)	(-3.49***)	(-4.12***)	(-3.70***)
Adj. r^2	3.84%	4.40%	3.72%	3.59%	2.65%	5.81%	2.70%	7.00%	8.97%
F-value	0.0075	0.0036	0.0058	0.0008	0.0789	0.0002	0.0068	0.0001	0.0000
N	2093	2093	2093	2222	2222	2222	2167	2167	2167

Notation: Variable definitions see table 1; STD^2 (STD2), LTD^2 (LTD2), TD^2 (TD2); Significance at the level 0.05 (*) 0.01 (**) 0.001 (***)

However, since all p-values are not significant and the regression model for the influence of LTD on ROA was reported as insignificant, there is no evidence to support the argument that the influence of capital structure on firm performance is inverted U-shaped. Therefore, hypothesis 1 has been rejected. As for the control variables, size is significant in all models. However, in the case of predicting the accounting measures of firm performance ROE and ROA, size has a negative influence, whereas the influence on Tobin`s Q is positive. The negative influence on accounting measures of firm performance could be due to monitoring costs and hierarchical managerial inefficiencies, which result in lower firm performance. The reason for the positive influence of size on Tobin`s Q could be explained as investors might assume that bigger firms operate with a higher efficiency and better management compared to smaller companies. Tangibility influences the performance measure ROENI only in the model of predicting ROENI by TD, while the influence is negative.

6.3.2 Positive influence

Tests have been run in order to determine if the influence of capital structure on firm performance is linear and positive for German public listed companies. The general regression model has been used and the results are reported in table 5. As it can be observed the overall adjusted r^2 varies across the tests from 2.66% to 8.23%. This means in the case of measuring ROE by TD, where the adjusted r^2 value is 8.23%, that 8.23% of the variance in ROE can be explained by the model. Furthermore, the F-values for all tests are below 0.05, meaning that they are significant. LTD has a highly significant positive influence on ROE with a coefficient of 0. 543. This means, given that all other parameters are constant, one unit increase in LTD results in a 0.543 increase in ROE. STD has a positive and significant influence on ROA, whereas it has no significant influence on predicting ROE and Tobin`s Q. TD has a positive and significant influence on ROE and ROA with coefficients of 0.561 and 0.149 respectively. However, again all measures of capital structure have no significant influence on the performance measure Tobin`s Q. Therefore, we can conclude that leverage has a significant and positive influence on firm performance but only

Table 5 Regression results for positive linear relationship

	Tobin`s Q			ROANI			ROENI		
STD	-0.252			0.130			0.095		
	(-0.81)			(2.79**)			(0.56)		
LTD		0.407			0.085			0.543	
		(1.24)			(1.79)			(3.72***)	
TD			0.117			0.149			0.561
			(0.36)			(3.47***)			(5.52***)
RK	-0.905	-0.906	-0.964	-0.045	-0.013	-0.038	-0.140	-0.034	-0.153
	(-1.94)	(-1.88)	(-2.10*)	(-0.71)	(-0.20)	(-0.61)	(-0.80)	(-0.21)	(-0.88)
TAN	-0.823	-0.983	-0.853	-0.016	-0.052	-0.067	-0.093	-0.292	-0.267
	(-2.61**)	(-2.91**)	(-2.46*)	(-0.29)	(-0.94)	(-1.21)	(-0.64)	(-2.20*)	(-1.81)
GA	0.034	0.020	0.027	0.026	0.024	0.022	0.066	0.048	0.048
	(0.22)	(0.13)	(0.18)	(1.58)	(1.48)	(1.35)	(1.38)	(1.07)	(1.07)
GS	0.021	0.010	0.010	0.011	0.014	0.010	0.026	0.022	0.009
	(0.31)	(0.14)	(0.15)	(1.28)	(1.55)	(1.08)	(0.84)	(0.75)	(0.32)
SZ	0.291	0.299	0.300	-0.040	-0.043	-0.038	-0.151	-0.154	-0.141
	(2.02*)	(2.05*)	(2.08*)	(-2.45*)	(-2.73**)	(-2.49*)	(-3.48***)	(-4.15***)	(-3.70***)
Adj. r^2	3.83%	4.08%	3.75%	3.5%	2.69%	5.33%	2.66%	6.78%	8.23%
F-value	0.0043	0.0018	0.0041	0.0012	0.0474	0.0010	0.0041	0.0001	0.0000
N	2093	2093	2093	2222	2222	2222	2167	2167	2167

Notation: Variable definitions see table 1; Significance at the level 0.05 (*) 0.01 (**) 0.001 (***)

Table 6 Regression results for different industries

		Tobin`s Q			ROANI			ROENI			Obs.
Ind 1	STD	2.196*			0.481			1.312			
	LTD		-0.288			-0.315			-0.897		20
	TD			0.677			-0.422			-1.268	
Ind 2	STD	-4.165			0.070			0.246			
	LTD		-2.716			0.344			0.498		32
	TD			-3.693*			0.188			0.361	
Ind3	STD	0.365			0.262			0.855			
	LTD		-0.518			-0.150			-0.411		27
	TD			-.0402			0.261			1.035	
Ind4	STD	0.008			0.099			0.197			
	LTD		-0.399			0.067			0.334		1,264
	TD			-0.368			0.107*			0.419**	
Ind5	STD	-0.380			0.095			0.174			
	LTD		0.476			0.111			0.528		328
	TD			-0.033			0.181*			0.769*	
Ind6	STD	-0.112			0.034			-0.958			
	LTD		-0.285			0.128			1.433**		124
	TD			-0.418			0.177			0.569	
Ind7	STD	-1.981			0.131			0.302			
	LTD		-1.104			-0.192			-0.446		72
	TD			-2.290			-0.151**			-0.351	
Ind8	STD	-0.637			0.232**			-0.068			
	LTD		1.812*			0.1743			0.810 ***		544
	TD			0.835			0.269			0.632***	

Notation: Variable definitions see table 1; Significance at the level 0.05 (*) 0.01 (**) 0.001 (***); Agriculture, Forestry and Fishing (Ind1), Mining (Ind2), Construction (Ind3), Manufacturing (Ind4), Transportation, Communications, Electric, Gas and Sanitary service (Ind5), Wholesale trade (Ind6), Retail trade (Ind7), Services (Ind8)

when firm performance is measured by accounting measures. This could be interpreted as leverage influences the inner performance of a company, but the market does not make this link. For the market, an increase in leverage has no influence on the performance of a company. Again, the control variable size is significant for all models and as discussed before, has a negative influence on firm performance measured by the accounting measures ROE and ROA and has a positive influence on Tobin`s Q. Tangibility has a significant negative influence on firm performance measured by Tobin`s Q, meaning that the

market assumes an increase in fixed assets will reduce the performance of a company. Overall, there is sufficient evidence to support hypothesis 2, meaning that the influence of capital structure on firm performance is linear and positive.

6.3.3 Industry effects

The general regression model has been run for each of the 8 industries and the results are presented in table 6. Reporting all results for each industry, including all control variables and p-values would have been too ambiguous. Therefore, and for the sake of clarity, only the coefficients of the independent variables have been reported in the table. As it can be seen the significance of capital structure influencing firm performance differs. For Industry 1, the only positive and significant influence on performance has STD, measuring Tobin`s Q. Contradicting, Industry 2, reports that only TD has an influence on the performance, measured by Tobin`s Q and the impact is negative. As the results show, capital structure has no influence on performance regarding Industry 3. For Industry 4 and 5, TD has a significant and positive influence on performance, measured by ROENI and ROANI. Furthermore, LTD has a high a positive influence on ROENI for Industry 6. TD has a negative influence on the firm performance of Industry 7, measured by ROANI. Finally, for Industry 8, STD has a positive influence on ROANI, LTD has a positive influence on ROENI and Tobin`s Q and TD has a positive influence on ROENI. To conclude, the results provide strong evidence for supporting hypothesis 3, meaning that the influence of capital structure on firm performance differs among different industries.

6.3.4 Robustness

Several approaches have been used to ensure the robustness of the results. First, as discussed before, the models have been tested for autocorrelation and heteroskedasticity and have been adjusted accordingly. Furthermore, the usage of a fixed effect model was underpinned by the literature and the Hausman test. Next, the regressions have been run separately for each independent variable in order to ensure that the influence of multicollinearity is reduced. Finally, two more models have been run in order to test the robustness of the initial model. In the first one, year dummies have been added and in the second model, the dependent variable ROENI and ROANI have been exchanged by the measures ROEEBIT and ROAEBIT. Both models did not report results that differ significantly from the initial model, indicating that the test results are robust.

7. CONCLUSION

The aim of the paper was to investigate the influence of capital structure on firm performance for German public listed firms. Analyses were run under a fixed effect regression model. The results give strong evidence for rejecting the assumption of the trade-off theory (Kraus and Litzenberger, 1973) arguing that the influence of capital structure is inverted U-shaped. This is in alignment with Le and Phan (2017) and Margaritis and Psillaki (2010). Moreover, strong evidence was presented that capital structure has a linear and positive influence on firm performance, which confirms the assumption of the agency cots theory (Jensen and Meckling, 1976). These results are also in alignment with Margaritis and Psillaki (2010), Gill et al. (2011) and Le and Phan (20017). However, a distinction must be made regarding accounting measures and market measures of firm performance. The findings show that capital structure influences accounting measures of firm performance positively, whereas it appears that capital structure has no influence on the market-based measure, Tobin`s Q. This means that the inner firm performance increases when leverage increases, whereas the market does not assume that leverage has an influence on firm performance. Finally, a deeper analysis has been conducted regarding the different industries of Germany. Results conclude that capital structure influences each of the industries except for the Construction industry. For all other industries, capital structure has an influence on firm performance. Nevertheless, the results show different outcomes for each industry. The differences in the influence of capital structure on firm performance are assumed to be due to the completely different nature of operations.

Nevertheless, three limitations regarding the reliability of the research have to be made. The first one is the sole use accounting (book value) measures for capital structure. The second limitation has to be made regarding the acceptance of the third hypothesis. Since the amount of firm-year observations was quite small for some industries, e.g. 20 (Ind.1), 32 (Ind.2), 27 (Ind.3) and 72 (Ind7), meaning that the results might be misleading and not representing the true relationship. Finally, even though winsorizing the data at 2.5% and 97.5% was justifiable after reviewing the raw data, the process of winsorizing might have reduced the impact of proper observations, hence infected the results of the analyses

The results of this study contribute to the body of research conducted in the field of capital structure. Furthermore, this study provided strong evidence that the influence of capital structure on firm performance differs among the German industries. This insight challenges the existing literature, since most of the studies conducted in this field observed the relationship in a broader way, meaning they did not consider that the influence of capital structure on firm performance could differ across the industries. Therefore, more studies have to be conducted in order to support or diminish this assumption. Important is, that future studies contain enough firm-year observations for each industry, in order to provide reliable results.

Based on the results of this study, several practical suggestions can be made. Managers who are not working in the Mining, Construction or Retail trade industry, have no reason to be concerned when decisions have to be made regarding an increase in leverage, since the increase in debt will either benefit the value of the company on the market, increase their operating performance or increase their efficiency of using their shareholders funds for their operations. Especially for managers in the Service industry, an increase in leverage will benefit all of the three factors mentioned. The highest increase in ROE, when increasing leverage, can be found in the Wholesale trade industry. This means, that an increase in leverage will result in a more efficient way of utilizing their funds, which is of tremendous interest and importance for existing and new investors. Furthermore, managers working in the Construction industry should not attempt to increase their performance through an increase in leverage, since the increase in debt will have no effect on their performance. Next, managers in the Retail trade industry should be cautious about increasing their debt ratio, since it will negatively influence their ability to generate profit from their invested capital. Finally, managers operating in the Mining industry should be highly certain about their decision to increase their leverage, since the market assumes that the increase in debt will influence their performance negatively and investors will become nervous.

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9. APPENDIX

Table 7 Literature review summary

Author, year	Dependent variable	Independent variable	Control variable	Found Relationship	Country, sample size, year
Abor (2005)	ROE	LTD, STD, TD	SZ, GA	+ STD, + TD, - LTD	Ghana, 22, 1998-2002
Tian and Zeitun (2007)	ROA, ROE, PROF, Tobin`s Q, MBVR, P/E, MBVE	LTD*, STD*, TD*	Tax, TAN, SZ, GA, Industry Sector	-	Jordan, 167, 1989-2003
Lin and Chang (2009)	Tobin`s Q	TD*,	SZ, GA, Age, RK, Industry sector	+/-	Taiwan, 196, 1993-2005
Ebaid (2009)	ROE, ROA, GM,	LTD, STD, TD	SZ	0	Egypt, 64, 1997-2005
Margaritis and Psillaki (2010)	PE	TD	TAN, Intangibility, GS, Ownership concentration,	+	France, 1534, 2002-2005
Gill et al. (2011)	ROE	LTD, STD, TD	SZ, GS, Industry	+	America, 272, 2005-2007
Umar et al. (2012)	EBIT, ROE, ROA, EPS, P/E	LTD, STD, TD	SZ	-	Pakistan, 63, 2006-2009
Stephen (2012)	ROE, ROA, P/E	LTD, STD	SZ, GA	-	Kenya, 27, 2001-2010
Vatavu (2015)	ROA, ROE	LTD, STD, TD, TE	TAN, Tax, RK, Liquidity, Inflation	-	Romania, 196, 2003-2010
Le and Phan (2017)	ROA, ROE, Tobin`s Q	LTD*, STD*, TD*	GS, RK, TAN, Tax, Investment, Cash flow, Profitability, Liquidity, Dividend	+	Vietnam, 466, 2007-2012

Return of equity (ROE), Return on assets (ROA), EBIT plus depreciation to total assets (PROF), Total market value divided by total assets value (Tobin`s Q), Market value of equity to the book value of equity (MBVR), Price per share to earnings per share (P/E), Market value of equity and book value of liabilities divided by book value of equity (MBVE), Gross profit margin (GM), Earnings per share (EPS), Ratio of total debt to book value of total assets (TD), Ratio of total debt to book and market value of total assets (TD*), Ratio of long term-debt to book value of total assets (LTD), Ratio of long term-debt to book and market value of total assets (LTD*), Ratio of short term-debt to book value of total assets (STD), Ratio of short term-debt to book and market value of total assets (STD*), Size (SZ), Risk (RK), Growth in assets(GA), Growth in sales (GS), Tangibility (TAN), Significant positive relationship (+), Significant negative relationship (-), Weak to no relationship (0), Relationship switches from positive to negative when debt becomes too high (+/-)