MASTER THESIS

The impact of corporate diversification on the capital structure of publicly listed firms

Evidence from a comparison between German and Italian firms

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Abstract

This study examined the impact of corporate diversification on the capital structure by making a comparison between German and Italian publicly listed firms. Firms were sorted into clusters of firms by their degree of product diversification (focused, moderate diversified and conglomerate) to explain the differences in corporate financial behavior. Ordinary least squares (OLS) regression analysis was conducted. Firstly, this study found an insignificant impact of corporate diversification on the capital structure. Secondly, this impact on the capital structure differs across degrees of product diversification. German focused firms had a positive significant impact on leverage, whereas a negative significant impact was found for Italian focused firms, Italian conglomerates and German conglomerates. The differences in GDP growth and corporate tax rates between Germany and Italy did not make a considerable difference in the comparison, measured by non-debt tax shields. There were no significant differences found using year and industry control. In order to test the endogeneity problem, an additional regression with one-year lagged independent and control variables was conducted. These results were consistent with the initial OLS regressions, suggesting that corporate diversification did influence the capital structure and not vice versa.

Keywords: corporate diversification, degree of product diversification, leverage, specialization ratio, Germany, Italy.

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1 Introduction

This study focuses on the impact of corporate diversification on the capital structure of German and Italian publicly listed firms in the years 2015-2017. This research analyzes the capital structure determinants for clusters of firms sorted into three groups divided by their degree of product diversification. The first chapter provides an introduction about the background of corporate diversification, capital structure and the impact of corporate diversification on the capital structure. Following that, the theoretical and practical relevance will be discussed, and the research questions and objective of the study will be described. Lastly, an overview of this study will be shown in the last section.

1.1 Background

Corporate diversification is a widely discussed research topic in the existing academic literature. Explaining differences in corporate diversification among firms was a theoretical and empirical issue in the field of strategic management since the work of Ansoff (1958). Financial theorists Modigliani and Miller (1958) stated that financing decisions are irrelevant for a firm's strategy and behavior. Although, Myers and Majluf (1984) pointed out that financing decisions are actually important due to market imperfections. The majority of previous studies focused on the benefits and costs of several corporate diversification strategies on firm value. La Rocca et al. (2009) described that the interaction effect between corporate diversification and the capital structure of a firm became of interest due to strategic implications in the field of corporate governance. Jensen and Meckling (1976) were one of the first authors who highlighted the interaction between the capital structure and management choices. Later, during the 1980's, several studies focused on the relation between investment and financial choices, which resulted in the connection between the capital structure and "diversification" as it is called nowadays (Oviatt, 1984; Titman, 1984; Jensen, 1986; Barton and Gordon, 1987; Barton and Gordon. 1988; Gertner, Gibbons, Scharfstein, 1988; Titman and Wessels, 1988; Williamson, 1988).

Zheng (2017) explained corporate diversification for a firm as the process of expanding business segments in multiple areas. Reasons to apply corporate diversification are: competitive advantage (Matsuka, 2001), acquisition of value, rare, inimitable and non-substitutable resources (Barney, 1991) and a reduction of the vulnerability of a firm (Maksimovic & Philips, 2008). Disadvantages of corporate diversification are: lack of expertise of corporate diversification strategies (Lewellen, 1991), 2] no consensus about the effect of corporate diversification on firm valuation (Kaplan & Weisbach, 1992; Li & Li, 1996; Singh et al., 2003; Aggarwal & Samwick, 2003; Berger and Ofek, 1995; Hoechle, Schmid, Walter & Yermack, 2012; Amman et al., 2012; Zahavi & Lavie, 2013; Choe, Dev & Misra, 2014; Villalonga, 2004) and a possible operational wealth loss due to corporate diversification beyond the optimal level (Ekkayokkaya & Paudyal, 2015). There is no consensus, however, many firms believe that corporate diversification enables them to create more revenue and mitigate the possibility of financial distress (Choe et al., 2014; Villalonga, 2004). Corporate financial behavior can be explained by the degree of product diversification sorting firms in three group as focused firms, medium diversified and conglomerate,

and the direction of corporate diversification, distinguishing related and unrelated diversification strategies (Lewellen, 1971; Rumelt (1974). La Rocca et al. (2009) pointed out that related diversification is based on operational synergies and unrelated diversification into financial synergies. In addition to La Rocca et al. (2009), Monteforte and Staglianò (2015) examined the impact of international and product diversification on the capital structure.

The capital structure is the way a firm finances its overall operations and growth. Firms finance their activities by internal and external financing (O'Brien, David, Yoshikawa & Delios, 2014). A study by Chatterjee and Wernerfelt (1991) suggested that the form of diversification depends on the availability of financial resources to the firm, dividing this recourse in debt versus equity, or private versus public sources of funding. Until today, previous research mainly focused on the impact of firm valuation as a result of corporate diversification. Previous studies conducted by Kaplan and Weisbach (1992); Li and Li (1996); Singh, Davidson and Suchard (2003) suggested that diversified firms need to carry more debt in their capital structure to maximize firm value.

Aggarwal and Samwick (2003), Berger and Ofek (1995) and, Hoechle et al., (2012) concluded that corporate diversification will result in a decrease on firm value. Amman, Hoechle et al. (2012) and Zahavi and Lavie (2013) found no impact of corporate diversification on firm value. Choe et al., (2014) and Villalonga (2004) found that diversified firm experience an increase on firm value. The previous studies mainly focused on the effect on firm value, however, studies by La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et a. (2003) showed that the capital structure is inevitable effected. O'Brien et al. (2014) applied research in a reversed perspective, by stating that the capital structure has an effect on corporate diversification strategies from a transaction cost perspective. The authors described that the transaction costs economics predict that higher leverage will lead to lower performance for firms expanding into new markets or segments. High leverage can be harmful for firms trying to diversify because it inhibits discretion and adaptive experimentation (O'Brien et al., 2014). The study found that diversified firms carry more debt in their capital structure than non-diversified firms. This result is in line with previous studies by Kaplan and Weisbach (1992); Li and Li (1996); Singh, Davidson and Suchard (2003). The studies of Kochhar and Hitt (1998), La Rocca, La Rocca, Gerace and Smark, (2009), Monteforte (2015) and Sigh (2003) had a specific focus on the impact of corporate diversification on the capital structure and found mixed results. The papers of Kochhar and Hitt (1998), La Rocca et al. (2009) and Singh et al. (2003) had a focus on related versus unrelated diversification. Monteforte and Staglianò (2015) measured corporate diversification by distinguishing it by product diversification and international diversification. A study close to this present study is conducted on Italian firms by La Rocca et al. (2009). The study examined the role of corporate diversification on the capital structure by the use of theories as the trade-off theory and pecking order theory to explain different financial behaviors of firms.

1.2 Theoretical and practical relevance

This study contributes to the relative limited available literature examining the relationship between corporate diversification and the capital structure. Additionally, this study analyses the different impact in the capital structure determinants for clusters of firms divided by their degree of product diversification following previous work of La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003). Theoretical arguments of previous financial studies were not in line with each other by providing diverse arguments for the underlying theory of the impact of corporate diversification on the capital structure. Smart, Megginson and Gitman, (2004) mentioned that the pecking order theory prefers internal funding to decrease the risk of financial distress. MacKie-Mason (1960) provided evidence for the pecking order theory by highlighting the existence of asymmetric information. The authors wrote that the pecking order theory gives firms a reason to care about the funds in the form of internal finance by shareholders. Williamson (1988) and McGuinnes (1994) stated that the transaction cost theory will result in an increase in the debt capacity. The transaction cost theory prefers debt over equity because of its lower cost of capital in general. Lastly, Morri and Beretta (2008) preferred debt according to the agency cost theory, because of the use as a governance device.

The studies of Kochhar and Hitt (1998), La Rocca et al. (2009), Monteforte (2015) and Sigh et al. (2003) and Monteforte and Staglianò (2015) were conducted pre-crisis of 2008. Previous samples were 187 American manufacturing firms (Kochhar & Hitt, 1998), 180 Italian listed and unlisted firms (La Rocca et al., 2009), 126 Italian non-financial firms, listed and unlisted (Monteforte & Staglianò, 2015) and 1.127 U.S. firms (Singh et al., 2003).

Consequently, this present paper contributes to the existing literature in several ways. Firstly, due to diverse results from previous studies, this study will examine previous findings in a new after-crisis German and Italian context in the years 2015-2017. The direct impact of corporate diversification on the capital structure, measured by leverage will be tested. Secondly, this study analysis the differences in the impact on the capital structure for clusters of firms sorted by their degree of product diversification (focused firms, moderate diversified and conglomerate) to evaluate the possible existence of structural differences in impact of corporate diversification.

Thirdly, in addition to the second contribution, this study analyzes the differences in the impact of capital structure determinants across degrees of product diversification and its impact regarding the leverage issue. Fourthly, , this study is conducted after the credit crisis of 2008, while previous studies were conducted pre-crisis. The impact of capital structure determinants might have changed due to new regulations after-crisis across degrees of product diversification and countries. To illustrate, due to differences in regulations between Germany and Italy, non-debt tax shields might have more impact in Germany than in Italy due to differences in corporate tax rates (La Rocca et al., 2009). Previous methods used by Kochhar and Hitt (1998), La Rocca et al. (2009), Monteforte and Staglianò (2015) and Sigh et al. (2003) will be examined and combined to test the impact in the present time by the use of panel data.

1.3 Research objective and questions

Previous studies were somewhat diverse about the impact of corporate diversification on the capital structure. Monteforte and Staglianò (2015) stated that most recent research documents found that corporate diversification is negatively related to firm value. If corporate diversification theoretically creates the potential for an increase in a firm's debt capacity, and increased debt capacity is documented in the results of empirical studies as well, it could be possible that the increased debt capacity combined with utilization of the increased capacity of debt offsets the value loss from corporate diversification.

Several research questions were addressed to examine why there are differences in the impact on the capital structure across degrees of product diversification and why diversification in general seemingly increases the debt capacity and increases debt usage (La Rocca et al., 2009; Monteforte and Stagliano, 2015; Singh et al., 2003). This study reexamines the impact of corporate diversification on leverage. The methods and results of prior studies conducted pre-crisis will be examined and evaluated in the present time and therefore is the following main research question derived:

RQ1: What is the impact of corporate diversification on the capital structure of publicly listed German and Italian firms?

Furthermore, this study focusses on the impact on leverage, identified in prior research and measured leverage across degrees of product diversification for clusters of firms. The sample is sorted into three groups according to a cluster analysis approach (focused firms, medium diversified firms and conglomerate) to test whether there are differences in the impact on leverage across degrees of product diversification. Therefore, the second sub-research question is derived:

RQ2: Are there differences in the impact across degrees of product diversification (focused, moderate diversified and conglomerates) on the capital structure of publicly listed German and Italian firms?

Lastly, the differences of capital structure determinants will be analyzed across clusters of firms. An assumption is that it might not be corporate diversification per se that impacts the choice to use leverage, but that corporate diversification may proxy for some excluded determinants or control variables of leverage and only appear to influence leverage usage (Monteforte and Staglianò, 2015). Therefore the third research question is derived:

RQ3: Are there differences in capital structure determinants across degrees of product diversification (focused, moderate diversified and conglomerates of publicly listed German and Italian firms?

1.4 Structure of study

This study is organized as follows. To begin with, chapter 1 provides an overview of the main concepts in the field of study, theoretical and practical relevance, and the goal of this study. Chapter 2 provides an overview of the theoretical framework and empirical evidence, and reviews prior conceptual and empirical literature Chapter 3 describes the hypotheses development. After that, chapter 4 focusses on the research methodology. The research design, models and the measurement of the variables is explained. The fifth chapter emphasis on the sample and data used in this study. Chapter 6 displays the results. And lastly, chapter 7 provides the conclusions, limitations and recommendations for future research.

2 Literature review

This chapter provides an overview of the theory and empirical research concerning corporate diversification on the capital structure. Firstly, the concept of corporate diversification is well explained. Following that, the empirical evidence on the impact and the underlying theories for corporate diversification and the capital structure will be discussed separately. After that, underlying theory and impact of corporate diversification on capital structure will be discussed. Lastly, the interaction effect, regarding a reciprocal relationship and moderation effect between corporate diversification and capital structure will be described.

2.1 Corporate diversification

Corporate diversification arises when a firm expands their business segments in multiple areas (Zheng, 2017). For example, a restaurant that opens a second store in the city is not an example of corporate diversification but just an expansion of their business. Zheng (2017) stated that a firm has to expand their business segment in multiple areas, meaning for example, not opening a second store, but expanding their business into external catering or cooking classes. Martin and Sayrak (2003) stated that corporate diversification is a single firm which has business units that operate in different industries and are under control of a single firm. Fauver, Houston and Naranjo (2003) expressed that the corporate diversification as the process in which a firm enters an industry or market outside of their core business.

Denis, Denis and Sarin (1997) defined corporate diversification a step further by distinguishing corporate diversification in national or international corporate diversification. Whereas Erdorf, Hartmann-Wendels, Heinrichs and Matz (2013) distinguished corporate diversification in two different levels namely, related, (applying corporate diversification in the same industry), or unrelated, (applying corporate diversification in another industry). Tanriverdi and Venkatraman (2005) measured related corporate diversification on the skills or resources which have their businesses in common. The authors measured unrelated corporate diversification as the extent to which the different businesses of a firms do not have the similar skills in common. Neffke and Henning (2013) agreed with Erdorf et al. (2013) by stating that a firm can relatively easy expand their business in a related segment because of the similar characterizes of that business. Chatterjee and Wernerfelt (1991) identified corporate diversification by the characteristics of resources controlled by the existing business of the firm. The authors demonstrated that firms with high levels of specialized assets or intangible assets tend to be less flexible. As a result, it is most likely to apply related diversification strategies in an attempt to transfer resources across businesses.

Zheng (2017), Martin and Sayrak (2003) and Fauver et al. (2003) formulated corporate diversification in their own way. The definition used in this study is based on the definitions of the authors but is newly formulated to have an unambiguous translation. The definition will be, corporate diversification is the process of a firm expanding in other segments outside of their core business, related, unrelated, national or international. La Rocca et al. (2009) stated that previous studies tried to explain and determine financial behavior of several firms by the trade-off theory and pecking order theory. The authors added that previous research tried to understand capital structure

decisions in the form of firm-specific features, industry and institutional environments. Their literature review suggested that distinguishing diversification strategies in related diversification and unrelated strategies will result in a better understanding of the capital structure. Studies which did not include these two different strategies are potentially biased according to Singh et al., (2003) and Low and Chen (2004).

2.1.1 Empirical evidence on impact of corporate diversification

One of the early studies conducted by Weston (1970) found that diversified firms might allocate resources more efficiently because of the possibility of internal financing compared to external capital markets. Therefore, Weston (1970) suggested that the motive for firms to apply diversification can be motivated by the increase in the efficiency of allocating resources. Although, later studies conducted by Montgomery (1985) and Berger and Ofek (1995) re-evaluated the effect and found a negative relationship which assumes that diversification had a value decreasing effect.

Ekkayokkaya and Paudyal (2015) found that corporate diversification beyond the optimal level will result in a wealth loss. Hoskisson and Hitt (1990) added that inappropriate diversification can destroy firm value. Many authors as, Kaplan and Weisbach (1992), Li and Li (1996) and Singh et al., (2003) suggested that diversified firms have higher negative leverage ratios to increase firm value in comparison with non-diversified firms, which may increase the risk of financial distress. Previous results do not change in an international sample used by Majocchi and Strange (2012) who suggested that agency problems can be even worse using international corporate diversification.

Kaplan and Weisbach (1992), Li and Li (1996) and Singh et al. (2003) suggested that firms have more leverage as a result of diversification strategies, whereas Myers (1984) and Diamond (1991) suggested that firms with agency problems and the often-associated information asymmetries lead to lower leverage. Chen and King (2014) found similar results in their study, by pointing out that more severe agency problems and information asymmetry result in a higher probability of financial distress and lower shareholder trust. Chen and King (2014) added that information asymmetry negatively effects firm value and the availability of long-term capital. Information asymmetry makes it harder to value a firm because of more private information. Enriques and Volpin (2007) suggested that not only management incentives can be relevant, but also resultant risk of minority shareholders and debt holder expropriation.

2.1.2 Underlying theory on corporate diversification

The agency theory describes the relation between the alignment of the manager of a firm and their shareholders (Eisenhardt, 1989). Aggarwal and Samwick (2003) added that there is a possibility that the vision of the manager and the shareholders are not in line with each other. This underlying theory is helpful, but it does not clarify the motive(s) for a corporate diversification strategy. Aggarwal and Samwick (2003) found in their study that managers in general want to reduce the risk of financial distress for firms. Corporate diversification seems to be the common way to reduce the exposure of financial distress. The agency theory describes that managers could have higher private priorities than the firm's priorities as: job security and their personal interest (Aggarwal &

Samwick, 2003). The best interest of a manager, besides job security, is the possibility of a bonus by creating shareholder value to maintain their position as a manager.

The resource-based view has a focus on the probability of a competitive advantage due: to value, rare, inimitable and non-substitutable resources ("valuable resources" from now on) owned by a firm (Barney, 1991). Matsusaka (2001) stated that a firm can achieve a competitive advantage over competitor's due to their possession of valuable resources. Matsusaka (2001) described that this competitive advantage can be used in other segments as well. A value increasing effect for a firm can be a motive to apply corporate diversification. Wan, Hoskisson, Short and Yiu (2011) stated that valuable recourses can be acquired by the acquisition of other firms. The possession of valuable resource can be a motive for firms to apply corporate diversification due to the resource-based view. Continuity of operations and the certainty of valuable resources were the result of corporate diversification (Wan et al., 2011). Maksimovic and Philips (2008) pointed out that the vulnerability of firms can be reduced by operating in more segments. Demand shocks can be absorbed by the different segments and reduce the risk of discontinuity of operations in the future.

Another incentive to apply corporate diversification relates to the resource-based view and is based on operational synergies. La Rocca et al. (2009) pointed out that operational synergies, created by related-diversification enables firms not only to share resources in the value chains among business, but also the transfer of skills which involves the transfer of skills among businesses. An incentive regarding the pecking order theory to apply corporate diversification is to create financial synergies. Businesses are not related to each other, however, financial synergies can be created by unrelated diversification which enables firms to benefit from the economies of an internal capital and labour market. La Rocca et al. (2009) stated that unrelated diversified firms can obtain tax benefits and reduce financial distress, explained by the coinsure effect.

The coinsure effect is an incentive to reduce the operation risk due to imperfect correlation between cash flows of businesses (Lewellen, 1971). An increase in corporate diversification from a broader product portfolio or an expanded customer base theoretically shields a firm better from default and financial distress. Therefore, a decrease in risk involved in holding debt in any of the combined entity will would expect to reduce the cost of leverage by the diversified firm which might be a reason to apply corporate diversification.

2.2 Capital structure

The capital structure is the way a firm finances its operations and growth by the use equity and debt (O'Brien et al., 2014). The capital structure is the mix of equity (for example: common stock and retained earnings) and debt which can be divided in 1] short-term (for example: accounts payable, leases and short-term loans) debt and 2] long-term debt (for example: bonds payable and mortgage payables). The primary role of the capital structure is the ability of a firm to meet the needs of its shareholders and the obligations regarding short-term and long-term debt. Ross, Westerfield and Jaffe (2005) and Hsiao et al. (2009) gave an almost identical definition of the capital structure. The authors described a capital structure as the way a firm finance itself by a combination of short-term debt, long-term debt and equity. Ross et al. (2005) added that the ultimate aim of an optimal capital

structure is to mix the financial sources for two reasons, maximize shareholders value and minimize the cost of capital for short-term and long-term debt.

O'Brien et al. (2014), Ross et al. (2005) and Hsiao et al. (2009) formulated capital structure in their own way, but the formulations were comparable. The definition used in this research is based on the definitions of the authors but is newly formulated to have an unambiguous translation. The definition will be, the capital structure of a firm is the way it finances its overall operations and growth by the use of equity, short-term and long-term debt financing. Modigliani and Miller (1958) and Lubatkin and Chatterjee (1994) did not agree with each other about the impact of capital structure on firm valuation. It is noteworthy to mention that Modigliani and Miller (1963) pointed out that the capital structure of a firm should be composed entirely out of short- and long-term debt because of the tax advantage. In addition, the Modigliani-Miller theory describes that the capital structure has no influence on a firm's valuation.

2.2.1 Empirical evidence on impact capital structure

Agency theory predicts that debt has a positive impact on firm performance for diversified firms, while, transaction cost economics predicts that debt has a negative impact (O'Brien et al., 2014). O'Brien et al. (2014) found in their Japanese sample that high leverage is harmful for R&D intensive firms, but not for firms that are contracting or managing a stable portfolio or market. O'Brien et al. (2014) wrote that debt should inhibit corporate diversification, although, it predicted mixed impact on the capital structure. MacKie-Mason (1960) provided evidence for the pecking order theory by stating: the importance of asymmetric information gives a reason for firms to care about the funds in the form of internal finance by shareholders. MacKie-Mason (1960) added that different fund providers would have different access to information. MacKie-Mason (1960) concluded that this is consistent with the pecking order theory because in practice, private debt is better informed than public debt. New shareholders feel that their interests are not covered (Abor, 2005). Monteforte and Staglianò (2015) found in their research that diversified firms can raise their debt at more attractive rates than non-diversified firms. Ooi (1999) mentioned that the profitability of a firm is positively related to their capital structure. Ooi (1999) found that profitable firms use more debt general because of their higher tax burden and lower levels of the risk of bankruptcy. A study conducted by La Rocca et al. (2009) described that the tax argument and thus tax shields is of great importance in their Italian sample because of a high form of fiscal pressure which is a practical example of the relevance of the trade-off theory. The trade-off theory is specifically important for Italian firms because Italy had one of the highest fiscal pressures in the world.

2.2.2 Underlying theory on capital structure

Previous studies tried to explain the motives behind the capital structure in several ways. First, Brigham and Houston (2001), Myers (2001), Monteforte and Staglianò (2015) and la Rocca et al. (2009) explained the capital structure by the Trade-off theory, which prefers higher levels of debt to use as a debt-shield. On the other hand, Smart et al. (2004), Amidu (2007), Abor (2005) and MacKie-Mason (1960) explained the motives by a preference of internal financing and the goal of

maximizing shareholder value relating to the pecking order theory. Morri and Beretta (2008), Jensen and Meckling (1976) and O'Brien et al. (2014) stated that the capital structure is controlled by agency costs which can prefer both equity, and debt.

Brigham and Houston (2001), Frank and Goyal (2008) in Monteforte and Staglianò (2015) described the trade-off theory as a situation where a firm borrows the marginal value of tax shields on additional debt in a way the present value of financial distress and possible costs is covered. Myers (2001) simplified the trade-off theory as a way a firm finances its cost of financial distress by having similar levels of debt and tax shields for tax savings. Frank and Goyal (2008) explained the benefits of debt as, the tax shield, the disciplinary role of debt and the lower informational costs of debt which will equal bankruptcy and agency costs. Myers (2001) added that the optimal level is reached when a tax shield covers all the costs of financial distress.

Smart et al. (2004) stated that the main purpose of the pecking order theory is maximizing shareholders' wealth. The authors mentioned that a hierarchy is used in choosing the preferred source of financing. The pecking order theory prefers using internal financing above external financing. Internal financing will be used by addressing the firms' retained profits. Smart et al. (2004) stated that a firm which applies the pecking order theory would prefer lower risk by using internal funding (shareholder's equity) instead of debt preferred by the trade-off theory. The two theories do not agree with each other and this makes it difficult to form conclusions about an optimal capital structure. Amidu (2007) pointed out that a main point of the pecking order theory is the determination of the capital structure. The author mentioned that there is asymmetric information between the managers and the shareholders. The pecking order theory assumes that the manager of a firm will favor existing shareholders over new shareholders.

The agency theory states that the manager is the agent on behalf of the owners of the firm (Morri & Beretta, 2008). Jensen and Meckling (1976) wrote that the existence of the agency theory lies in the conflict of interest between shareholders/owners of the firm and the managers. The agency theory assumes that the capital structure is controlled by agency costs (controlling activities of management) in the form of the costs for both debt and equity issue (Jensen & Meckling, 1976). Agency costs can be distinguished in 1] equity and 2] debt which both have an impact on the capital structure of a firm. First, 1] equity costs can be seen as the related cost to equity issue and may be included as monitoring expenses for the equity holders (Jensen, 1986). Additionally, the perspective on the agency costs of free-cash flow illustrate that firms with more discretionary cash flows had lower leverage. Consequently, there is a higher chance of managers investing in low-return project through the use of corporate diversification (Monteforte, 2015). Second, 2] debt can be seen as the opportunity costs caused by the decisions of managers, including the impact of debt on the investment decisions. Jensen (1986) pointed out the disciplinary role of debt. Debt influences managerial behavior by the reduction of free-cash flow. As a result, Jensen (1986) proposed that a manager can do less damage to a firm by reducing the free-cash flow which supports the positive role of debt as a monitoring device.

2.3 Corporate diversification on the capital structure

This chapter highlights the empirical evidence and underlying theory regarding the impact of corporate diversification on the capital structure.

2.3.1 Empirical evidence on impact corporate diversification on capital structure

Rumelt (1974) used a sample of 249 US firms and found that firms developing a strategy of unrelated corporate diversification had the highest leverage which relates to the financial synergy argument. This enables firms to benefit from the economies of an internal capital and labour market. Alonso (2003) used a panel data analysis for a sample of 480 Spanish manufacturing firms to measure the impact of a diversification strategy on the capital structure. The author used four alternative measures for the capital structure and two measures for corporate diversification, namely the Herfindahl and the Entropy index of total product diversification. The study did not find significant differences in the impact of different levels of product diversification and its impact on the capital structure which contradicts the coinsure effect argument. Stating that combining business will result in stronger entity, decreasing financial distress and higher leverage as a result of a lower cost of capital. La Rocca et al. (2009) used a panel of 180 Italian firms, including 76 publicly listed. Using the target adjusted model by the Generalized Method of Moments approach, results showed that total diversification is negatively related to debt ratios. So, higher degrees of product diversification had a negative impact on leverage. La Rocca et al. (2009) found that corporate diversification is clearly a determining factor in capital structure decision and therefore deserves more action in future research. Firms that diversify across degrees of product diversification are likely to have higher leverage. However, the authors found that related diversified firms had lower leverage than focused firms, and unrelated diversified firms had higher leverage than focused firms which is in line with the financial synergy argument. Qureshi (2012) used a sample of 75 firms in the Karachi Stock Exchange, distinguishing corporate diversification in product and geographic corporate diversification, sorted by product and geographical diversification. The results in the study supported the coinsure and transaction cost theory, firms applying corporate diversification had higher leverage compared to focused firms. Monteforte and Stagliano (2015) examined the link between product diversification and international diversification on the capital structure in a sample including the largest Italian non financial firms. The results showed that the complexity that arrises from corporate diversification had a negative impact on leverage. Singh et al. (2003) used a sample including 1.528 US firms and found that the degree of product diversification is on average unrelated to leverage.

2.3.2 Underlying theory of corporate diversification on capital structure

The coinsurance effect states that a firm can reduce the exposure to risk by implementing corporate diversification. The operating risk will be reduced due to the imperfect correlation between the cash flows if firms have several different businesses (Lewellen, 1971). A co-insurance effect arises by combining businesses with imperfect cash flows which enables firms to increase their leverage. The coinsurance effect described by Lewellen (1971), Heston and Rouwenhorst (1994) and Fatemi

(1984) have many similarities with the trade-off theory described by Brigham and Houston (2001), Myers (2001) and Ooi (1999) and is relevant for this study because it probably has a positive impact on leverage. The transaction cost theory deals with the governance and contractual relations between two parties in transactions (Williamson, 1988). Translated to the corporate finance theory by Williamson (1988), it means that examination of a firm's decisions is based on the specificity degree of a firm's assets.

McGuinnes (1994) described asset specificity as, the extent to which an investment in assets is made to support a particular transaction, to the extent it would have a higher value to that transaction, in comparison with the case, the manager would have used it for another investment. For example, an asset with a high level of specificity will prefer equity because this asset cannot be easily employed for another use in case of liquidation. Reversely, if an asset has a low level of specificity and serves a general purpose, it is relatively easy to use it somewhere else in a firm and will preferable be financed with debt. Most of a firm's assets can be considered to serve a general purpose which results in a higher capacity to meet scheduled debt payments to the bank and therefore leads to a lower cost of capital and an increase in a firm's debt capacity. In an ideal scenario, all assets would serve a general purpose. The transaction cost theory stated that assets with a general purpose are favorable and be financed with debt. Debt in general has a lower cost of capital than internal finance what makes its use attractive. There is no clear answer if diversified firms have a higher or lower asset specificity. Nonetheless, a distinction can be made between related and unrelated corporate diversification. Chatterjee and Wernerfelt (1991) and Pensore (1959) described that firms apply corporate diversification as a result of the presence of an excess of unutilized assets. Additionally, the direction of corporate diversification depends on the characteristics of these resources. Highly specific assets were mainly associated with related-corporate diversification. Those assets can not be easily re-employed in other businesses and keep a limited liquidation value. On the other side, low specific assets were mainly associated with unrelated diversification because they were more valuable in case of liquidation as collateral.

Lastly, the agency cost theory applied on the impact of corporate diversification on the capital structure. The general definition of the agency theory was the existence of conflicts between the manager (or agent) and the shareholders within a firm (Morri & Beretta, 2008). Jensen and Meckling (1976) specified the agency cost theory by stating that the agency cost theory provides another theoretical scheme relating corporate diversification on the capital structure as a governance device. The agency cost theory prefers the use of debt financing. As a governance device, it reduces the conflicts of the general agency theory described by Morri and Beretta (2008). Jensen (1986) added, debt financing reduces agency costs of free cash flows and avoids value decreasing decisions by managers of a firm. Shareholders will promote the use of debt financing because of the role it fulfills by disciplining the decisions of mangers.

2.4 Empirical evidence on impact capital structure on corporate diversification

Limited previous financial studies focused primarily on the impact the capital structure on corporate diversification. However, there is empirical evidence that the capital structure influences corporate diversification, or, that the relationship is likely to be a reciprocal (O'Brien et al. (2014). Kochhar (1996) pointed out that a firm's capital structure is an important governance mechanism that shapes monitoring incentives and impacts the corporate diversification strategy. O'Brien et al. (2014) found that not every firm can expand their business by corporate diversification. The capital structure of an existing firm might not be optimal for market expansion which indicates a reversed relation. O'Brien et al. (2014) found evidence for the reversed relation in their Japanese sample. Japanese firms accrue higher returns after leveraging their resources into new markets when managers are shielded from the rigors of the market governance of debt.

2.4.1 Underlying theory on impact capital structure on corporate diversification

Previous studies by Yoshikawa and Phan (2005), Chatterjee and Wernerfelt (1991) and Gibbs (1993) examined the reciprocal relationship between corporate diversification and the capital structure with a focus on debt. A conclusion was that debt in a capital structure tends to inhibit related diversification. Gibbs (1993) added that debt in a capital structure not only inhibits this firm's behavior but foster restructuring through a reduction in the diversification strategy. O'Brien pointed out that the relationship between diversification strategies and the capital structure is most likely reciprocal and cannot be seen as a single subject. For instance, a diversified firm with diversified cash flows results in higher debt levels by reducing the risk of a single cash flow, in the contrary, a high leverage (D/E) ratio constrained the ability of a firm to diversify. O'Brien et al. (2014) described that the agency theory predicts that debt should lead to higher performance for diversified firms, while the transaction cost economics that more debt will lead to lower performance for firms expanding into new segments.

3 Hypothesis development

This chapter reviews chapter two that examines the relationship between corporate diversification and the capital structure, measured by leverage to develop testable implications for German and Italian publicly listed firms. The first hypothesis tests the impact of corporate diversification on leverage. The second hypothesis tests if there are structural differences between the degrees of product diversification (focused firms, moderate diversified and conglomerate) and if a higher degree (moderate or conglomerate) moderate the impact on the capital structure.

3.1 Corporate diversification on capital structure

The literature review showed that there are many studies that provide evidence for a positive relationship between corporate diversification and leverage. Weston (1970) conducted one of the first studies on the impact of corporate diversification on the capital structure. The study found that diversified firms had less external financial constrains produced by excess debt. Furthermore, firms with corporate diversification strategies might have the ability to allocate resources more efficiently. Monteforte and Staglianò (2015) found in a later study that diversified firms have the ability to use internal financing instead of external capital markets. The use of internal financing reduces the chance of financial distress for firms (Monteforte & Staglianò, 2015). Lewellen (1971), Heston and Rouwenhorst (1994), Fatemi (1984), Kim and McConnel (1977) and Singh et al. (2003) explained the positive relationship between corporate diversification and the capital structure by the reduction of risk due to the coinsurance effect. The expansion of a firm's business by corporate diversification or by mergers and acquisitions enables a firm to combine businesses with imperfect cash flows. Lewellen (1971) wrote that the financial strength of the organization will be stronger, even when the acquiring firm takes on another firm's debt. The financial strength of the combined diversified firm shields itself from default better than any of the firms could have done alone. Hence, based on the co-insurance effect, firms will experience financial synergies trough combining businesses. Combining businesses with imperfect cash flows enables firms to lower their volatility of cash flow and cash earnings (Lewellen, 1971). The chance of financial distress of firms is decreased. Warga (2004) explained that investors are willing to accept lower returns on their loans when there is less volatility in a firm's cash flow. In addition, the cost of capital falls on the amount of risk that is taken by investors to fund a firm's debt.

Barney (1991) found evidence on the resource-based view, stating that a corporate diversification strategy enables firms to acquire valuable resources. This possession of valuable resources leads to a competitive advantage over competitors in the business. Matsuka (2001) added that this competitive advantage can be used in other segments as well. An increase in firm value by the possession of valuable resources to ensure the continuity of operations and less chance of financial distress are reasons to hypothesize a positive relationship between corporate diversification on the capital structure. Therefore, is derived:

H1: Corporate diversification has a positive impact on leverage.

3.2 Structural differences among clusters of firms by product diversification

La Rocca et al. (2009) wrote that previous studies paid little attention to role of corporate diversification as a determinant of the capital structure. The authors found in their pre-crisis Italian sample in the years 1980-2006 that diversification and the degree of product diversification are clearly a determining factor in capital structure decisions. La Rocca et al. (2009) found a positive relationship between a higher degree of product diversification on leverage. Diversified firms are likely to have higher debt ratios than specialized firms. Kochhar and Hitt (1998) found similar results with La Rocca et al. (2009).

Previous studies emphasized on the direct impact of a diversification strategy on the capital structure and found a positive relationship with leverage (La Rocca et al., 2009; Kochhar & Hitt, 1998 and O'Brien et al. (2014). However, differences across degrees of corporate diversification (focused firms, moderate diversified firms and conglomerates) and its impact on the capital structure were rarely studied. Singh et al. (2003) conducted a mean comparison across clusters of firms divided by their degree of product diversification and found a negative relationship with the capital structure. Highly diversified firms or conglomerates had lower leverage than focused firms which contradicts earlier findings of La Rocca et al. (2009) Kochhar and Hitt, (1998, but were in line with the results of Monteforte and Stagliano (2015).

Ekkayokkaya and Paudyal (2015) found that highly diversified firms can find themselves in an operational wealth loss due to corporate diversification beyond the optimal level. Besides that, when firms are highly diversified/conglomerate, the information asymmetry can be greatly magnified to the extent that it is too costly for investors to have an adequate understanding about the managerial decisions (Hitt et al. (1997). This argument suggests that moderate and highly diversified firms have lower leverage. More private information has a negative impact on leverage. (Ngugi, 2008).

Hence, the differences in clusters of firms divided by their degree of product diversification were rarely studied. Previous studies did not have an unambiguously answer to the effect of higher degrees of leverage and its impact on the capital structure. Monteforte and Stagliano (2015) and Singh et al. (2009) showed that agency problems
were likely to increase as a result of an increase in the degree of product diversification. Concluding the agency theory, higher diversified firms (moderate diversified and conglomerate) are expected to have lower leverage in comparison with specialized firms (focused firms).

In contrast, the coinsure effect found by Lewellen (1971) described that firms become a stronger financial entity after combining more businesses. This stronger diversified entity has the advantage of lower cost of debt which is supported by Hochhar and Hitt (1998) and La Rocca et al. (2009). Hence, the majority of previous studies found in general diverse results relating the two variables and therefore is derived:

H2: There are differences across degrees of product diversification (focused, moderate diversified and conglomerate) and its impact on the capital structure.

4 Methodology and variables

This chapter presents the research methodology of this study. To begin with, research methods used in prior studies to analyze the impact of corporate diversification on capital structure are presented. The study model to test the hypotheses is described and lastly, the measurement of the variables is presented.

4.1. Methodology

This empirical study examines the impact of corporate diversification on the capital structure, measured by leverage, and second, if one type of product diversification strengthens the relationship between firm leverage and the other types of product diversification. The method used by previous research of La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003) to explain the direct effect of corporate diversification on the capital structure is regression. Furthermore, Singh et al. (2003) showed that regression is an appropriate method to examine the strength and impact by applying and comparing separate cluster regressions to find structural differences between degrees of product diversification. Following prior studies, the regression analysis method seems to be most suitable for this study.

4.1.1 Regression analysis

The authors Hair, Black, Babin and Anderson (2004) pointed out that the regression analysis is the most used method to conduct analysis of causes to measure dependency. The regression analysis method uses independent variables to measure the dependent variable in the study, also called Y. Simple regression involves analysis of causes and measures the dependency by the use of one independent variable. Multiple regression involves analysis of causes and measures the dependency by the use of two or more independent variables. Four regression analysis methods can be distinguished to predict the dependent variable, namely, probit regression, logistic regression, linear regression and non-linear regression.

The probit and logistic regression are used in cases of the existence of a non-metric variable. The probit and logistic regression can be distinguished by the dependent variable. There is a dichotomous dependent variable (two answers possible) in the probit regression and a multichomous dependent variable in the logistic regression. The dichotomous dependent in the probit regression can only take two values and the multichomous dependent variable in the logistic regression can take multiple values. The purpose of the probit regression is to estimate the probability than an observations with particular characteristics will meet the requirements of one of the two categories. The probit and logistic regression can be written as: $y = f(\alpha+\beta x)$. The difference between the logistic and probit regression is the use of the link function. Logistic regression can be interpreted as modeling log odds. In the logistic regression, the coefficients can be interpreted as odds ratio. This method is not found in comparable previous studies.

The linear regression method is used when the dependent variable is metric while measured on an interval or ratio scale and is found in previous studies regarding the interest of this study. Ordinary least squares (OLS) is the simplest and most common form of linear regression. The

ordinary least squares regression estimates the dependent variable, with the goal to minimize the sum of squares of the differences between the independent variables and the dependent variable. The dependent variable has to be estimated, based on a giver predictor variable and can be written as: $y = \alpha+\beta*x+\varepsilon$. In the current study, "Y" is the dependent variable leverage and "x" is the explanatory variable, the degrees of product diversification. The "β" is the slope of the line and "α" is the intercept (value of "y_i" when "x" is zero).The capital structure, measured as leverage (using the debt to equity ratio and debt to total assets) is a metric variable measured by one independent variable. La Rocca et al. (2009) conducted an ordinary least squares regression in their study. Ordinary least squares seems to be suitable in this study as well. The non-linear regression method is used when the observable data is modeled by a non-linear function and are anything that does not follow the linear form. Non-linear functions can be distinguished in quadratic, exponential, power and cubic regressions and can be written as $y = f(x,\beta)+\varepsilon$. None of the previous studies by La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003) used a non-linear regression method. The ordinary least squares regression method has some advantages and disadvantages. Advantages are the relatively easy way to implement and analyze the regression in comparison with other regression techniques.. However, the main disadvantage of the ordinary least squares regression technique is the endogeneity problem (La Rocca et al., 2009; Monteforte & Staglianò, 2015). Endogeneity arises from measurement error, auto regression, reverse causality, simultaneous causality and omitted variables.

Monteforte and Staglianó (2015) used a two-stage least squares regression in their study to reduce endogeneity. The two-stage least squares regression adds an instrumental variable that is correlated with the endogenous variables but is uncorrelated with the error term. The instrumental variable will only have an effect on the independent variable of interest and not with other variables because it only correlates with the independent variable of interest. Unfortunately, there is no appropriate instrumental variable found in this study. A second method used by La Rocca et al. (2009) and Monteforte and Staglianó (2015) to account for endogeneity are lagged variables and were used to measure autocorrelation. Some studies made use of other regression models, namely a fixed-effects model or a random effects model. Fixed effects models are used for balanced, long-term data and random effect are used when cross-sectional observations are random drawings of a larger sample. Fixed effects were used in the studies of La Rocca et al. (2009) and Monteforte and Staglianò (2015). There were no random effects used in comparable studies of Kochhar and Hitt (1998), La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003).

4.1.2 Method applied in this study

The method used in this study is ordinary least squares regression (from now on: OLS regression). The reason to choose for this type of regression is that other studies that tested the impact of corporate diversification on the capital structure showed that an OLS regression is an appropriate method following La Rocca et al. (2009) and Monteforte and Staglianò (2015). The OLS regression determines the impact of the independent variables on the dependent variables using t-test statistics to see if this impact is significant or not.

4.2 Model

In order to test the hypotheses 1 and 2 in this study, the OLS regression is used to determine the impact of corporate diversification on the capital structure. To test the hypotheses, the following regression model is derived, similar to Monteforte and Staglianò (2015):

$FIRMLEV_{x,t} = \alpha_0 + \beta 1\ DOPD_{x,t} + \beta 2\ Control_{x,t} + \varepsilon_{x,t}$

Where:

α	Constant
$FIRMLEV_{x,t}$	Firm leverage for firm x in year t
$DOPD_{x,t}$	Degree of product diversification for firm x in year t
$Control_{x,t}$	Control variables, these are growth opportunities, non-debt tax shields, return on assets, firm size, tangibility and industry for x in year t
$\varepsilon_{x,t}$	Error term of firm x in year t

An issue that needs to be addressed is the possibility of endogeneity problems using the OLS regression. Statistically endogeneity in the model means that the models' errors are not truly random. This makes it possible that the OLS regression is mis-specified in a way and this makes identifying a causal relationship between two variables difficult (La Rocca et al. (2009). For example, leverage can be chosen by the management concurrently with other firm's decisions, raising a problem of simultaneity which can suggest the use of lags of some variables (La Rocca et al., 2009).

La Rocca et al. (2009) and Monteforte and Staglianò (2015) used a one-year lagged variable for the independent variable and control variables to test for endogeneity. Therefore, to test for endogeneity, an OLS regression with lagged variables on the righter side of the model is conducted. This additional OLS regression is used as a robustness check. The results of the OLS regression with an one-year lagged independent variable and control variables will be compared with the initial regression to control for endogeneity. If the results are comparable, it could be concluded that endogeneity does not play a role in this study. Additional robustness tests will be conducted later.

4.3 Variables

This section describes the measurement and discussion of the dependent, independent and control variables in this study based on literature review and empirical evidence of previous studies. An overview of the variables used in this study can be found in table 1.

4.3.1 Dependent variable

The dependent variable in this study is the capital structure which is measured by firm leverage. Previous studies described different ways to measure leverage for firms. Monteforte and Staglianò (2015) and La Rocca et al. (2009) measured leverage as the ratio of book value of total debt over the sum of the book value of equity and total debt. Singh et al. (2003) measured leverage as total debt to total assets of the firm which is basically the same measurement as Monteforte and

Staglianò (2015). Studies by Kremp et al. (1999), De Miguel and Pindado (2001) and Ozkan (2001) and Kochhar and Hitt (1998) examined the leverage of firms by the debt-to-equity ratio, dividing the total debt by the total equity of a firm.

This study measures firm leverage in two ways to validate the results. Firstly, leverage is measured by the total debt divided by total equity following Monteforte and Staglianò (2015). Studies by Kremp et al. (1999), De Miguel and Pindado (2001) and Ozkan (2001). And secondly, firm leverage is measured by dividing the total debt by the total assets (or as the ratio of book value of total debt over the sum of the book value of equity and total debt) following Monteforte and Staglianò (2015), La Roca et al. (2009) and Singh et al. (2003).

4.3.2 Independent variable

The independent variable used in this study is the degree of product diversification. There are different ways to measure corporate diversification, namely, the deterministic Rumelt categories (Rumelt, 1974; Barton and Gordon, 1988; Lowe et al., 1994), others used direct total diversification (Alonso, 2003; Singh et al., 2003; Low and Chen, 2004), and lastly, Kochhar and Hitt (1998) used related-unrelated diversification measures.

La Rocca et al. (2009) used the direct total diversification. The authors measured the degree of product diversification by considering the number of business segments and the amount of sales in each business segment to define product diversification. La Rocca et al. (2009) described that diversification is measured trough the Standard Industrial Codes (SIC) in Italy. The authors employed entropy indicators in the empirical analysis as the main measure to operationalize diversification. Entropy measures consider simultaneously the number of businesses of a firm and the distribution of a firm's total sales across industry segments (Jacquemin and Berry, 1979; Palepu, 1985 in La Rocca et al. 2009). Entropy indicators were deployed in the empirical analysis as the main measures to operationalize diversification, following prior studies. The entropy measure of total level of diversification is calculated as $\sum P_j * \text{In}(1/P_j)$, where P refers to the proportion of sales in business segment j and $\text{In}(1/P_j)$ is the weight of that segment. Consequently, the entropy indicator considers the number of segments in which a firm operates and the relative importance of each segment for firm sales.

Monteforte and Staglianò (2015) measured the degree of product diversification based on a database provided by Ricerche and Studi of Mediobanca. This database included the largest financial and non-financial Italian firms. This database was used because it provides information about the number and quantities of sales for each segment to measure the degree of product diversification. Singh et al. (2003) did not make a distinction between different degrees. Corporate diversification was measured using a product diversification dummy (D =1) for product-diversified firms and 0 for single-segment firms. The deterministic Rumelt categories was used by many previous studies (Rumelt, 1974; Barton and Gordon, 1988; Lowe et al., 1994). The values of the specialization ratios of Rumelt (1974) was one of the first measurements to distinguish firms. The specialization ratio of Rumelt (1974) is measured as the ratio of the firm's annual revenue from its largest discrete, product-market activity to its total revenues (Pandya and Rao, 1998; La Rocca et

al., 2009) Firms are classified in three groups (1) undiversified, single product firms with a SR ≥ 0.95, (2) moderately diversified firms with SR values between 0.95 < SR ≤ 0.7. The second group consists out of dominant, related diversified and unrelated diversified firms and lastly, (3) highly diversified firms with a SR < 0.7. The last group consists out of conglomerates, related-constrained and related-linked firms.

This study used the specialization ratio proposed by Rumelt (1974). It is one of the first measurements but is still widely used in present studies to measure the degree of product diversification of firms. This study labeled the three groups as following, group (1), undiversified, single product firms are labeled as 'focused firms' with a low degree of product diversification Group (2), moderately diversified firms are labeled as, 'moderate diversified'. Group (3), highly diversified firms are labeled as 'conglomerates'. A cluster analysis approach was applied to determine whether structural differences were present within the German and Italian sample.

4.3.3 Control variables

There are several control variables used in this study to clearly delineate the effect of corporate diversification on the capital structure by isolating other influences on firm leverage. This study highlights the relevance of growth opportunities, non-debt tax shields, return on assets, firm size, profitability and tangibility in explaining firm leverage. Those control variables are in line with previous studies of capital structure (Titman and Wessels, 1988; Rajan and Zingales, 1995; Monteforte and Staglianò, 2015; Singh et al., 2003; La Rocca et al., 2009). To verify the existences of differences in capital structure determinants for groups of firms, the following model was used following La Rocca et al. (2009).

4.3.3.1 Growth opportunities

Myers (1977) in La Rocca et al. (2009) pointed out that firms with high growth opportunities will retain financial flexibility through low leverage, in order to be able to exercise those opportunities in subsequent years. Jensen and Meckling (1976) wrote that firms with high leverage may miss market opportunities because investment effectively transfers wealth from the equity holders to the debt holders. Growth opportunities are expected to be negatively related to leverage. Growth opportunities are measured by the growth rate of annual sales following La Rocca et al., (2009) and Monteforte and Staglianò (2015).

4.3.3.2 Non-debt tax shields

La Rocca et al. (2009) pointed out that the Italian legislation specifies that firms are subject to a complex tax system. The overall corporate tax rate of Italian firms has been one of the highest in Europe for decades. Therefore, Italian firms are specifically sensitive to the possibility of tax deductions. De Angelo and Masulis (1980) in La Rocca et al. (2009) pointed out that firms with other possibilities than deducting interest on their debt have less leverage in their capital structure. Non-debt tax shields may be used as substitutions for tax benefits. Therefore, La Rocca et al. (2009) pointed out that firms with a large amount of non-debt tax shields as depreciation, are less likely to

increase the amount of debt for tax reasons. Non-debt tax shields might be an explanatory variable in the leverage issue. Firms with a low leverage ratio are expected to be inversely related to the level of non-debt tax shields for German and Italian organizations. The intensity of non-debt tax shields is expected to be stronger in Italy due to their corporate tax system. Non-debt tax shields is measured as depreciation and amortization divided by the total assets of a firm (La Rocca et al. (2009).

4.3.3.3 Return on assets

The relationship between the capital structure and the return on assets is theoretically and empirically controversial (Singh et al. (2003; La Rocca et al., 2009). The pecking-order theory prefers to finance each investment with internal funds (retained earnings), after that, issue of new debt and lastly, new issues of equity (Myers, 1984). Profitable firms are likely to substitute debt for internal funds. Hence, according to the pecking order theory, a negative relationship between return on assets and leverage is expected, following Singh et al. (2003) and La Rocca et al. (2009).

Regarding the trade-off theory, profitable firms prefer debt in order to benefit from a tax shield. Therefore, a positive relationship between return on assets and leverage is expected. Previous studies provide empirical evidence for both theories (Harris and Raviv, 1991 in La Rocca et al., 2009). This study measured return on assets similar to Singh et al. (2003) and La Rocca et al. (2009) as earnings before interest and taxes (EBIT) divided by the total assets of a firm.

4.3.3.4 Firm size

Previous studies by Harris and Raviv (1991) and Rajan and Zingales (1995) found firm size to be an important determinant of firm leverage. In most cases, large firms have more collateralizable assets and more stable cash flows than smaller firms. Therefore, La Rocca et al. (2009) described that firm size is inversely related to the probability of default. For this reason, larger firms are expected to carry more debt. In addition, larger established firms tend to have a better reputation on the debt markets which enables them to accumulate more debt (Diamond, 1989). Therefore, firm size is expected to be positively related to leverage. Firm size can be measured by the average level of total assets (Artiach, Lee, Nelson and Walker, 2010; Gamerschlag, Möller & Verbeeten, 2011), logarithm of total assets (La Rocca, 2009) and average level of sales (Ferri and Jones, 1979). This study measures firm size by the logarithm of total assets.

4.3.3.5 Tangibility

Jensen and Meckling (1976) stated that the agency costs of debt due to the possibility of moral hazards on the part of borrowers increases when firms cannot collateralize their debt. As a result, the cost of debt will increase because lenders will require more favorable terms and firms may choose equity instead (La Rocca et al., 2009). A larger percentage of a firm's assets can used as collateral to mitigate this issue. Although, Titman and Wessels (1988) and Rajan and Zingales (1995) found empirical evidence that tangible assets provide better collateral for loans. Therefore, tangibility is expected to be positively related with leverage. Monteforte and Stagliano (2015)

measured tangibility as the ratio of property, plant and equipment to net sales. La Rocca et al. (2009) measured tangibility as the ratio of property, plants and equipment to the total assets of a firm. This study followed the measurement of La Rocca et al. (2009).

4.3.3.6 Industry control

As mentioned earlier, over 50% of the firms included in the current research belongs to the manufacturing industry. Therefore, it is reasonable to suspect that the manufacturing industry may significantly accounts for the variance of results. The industry variables have been recoded into Manufacturing (*manufacturing firms as 1; else as 0*) and other industries (*Mining, Construction, Transportation and Public Utilities, Wholesale Trade, Retail Trade, Real Estate, Services and Public Administration as 1; else as 0*).

4.3.3.7 Year control

In order to testify the impact of years on the leverage of firms, the dummy variables have been implemented in the research. The year variables have been recoded into three year dummies, 2015 (*year 2015 as 1; else as 0*), and 2016 (*year 2016 as 1; else as 0*) and lastly, 2017 (*year 2017 as 1; else as 0).* Yet, there were only 2 dummy variables included in the regression analysis, which are year 2015 and year 2016. The year 2017 has been excluded from the regression analysis since it does not provide any additional information.

Table 1 Measurement of variables

Dependent variable		
Firm leverage	LEV	(Total debt)/ (Total equity)
	ALT_LEV	(Total debt)/ (Total assets)
Independent variable		
Degree of product diversification	DOPD	(Revenue core segment)/ (Total revenue)
Control variables		
Growth opportunities	GROW	(Total revenues$_t$ - Total revenues$_{t-1}$)/ Total revenues$_{t-1}$
Non-debt tax shields	NDTS	(Depreciation and amortization)/ (Total assets)
Return on assets	ROA	(Earnings before interest and taxes)/ (Total assets)
Firm size	LOG_SIZE	Natural logarithm of total assets
Tangibility	TANG	(Property, plants and equipment)/ (Total assets)
Industry	OTH_IND	Dummy variable for industries sorted by Standard Industry Classification
Year	YEAR	Dummy variable for the years 2015, 2016 and 2017

5 Data and sample size

This chapter describes how the data is obtained and how it is used in this study.

5.1 Data

The sample of this study is derived from the Orbis company database for the years 2015-2017. The initial German sample consists out of all publicly listed firms in Germany. The initial Italian sample consists out of all publicly listed firms in Italy. There was no requirement for a minimum annual sales volume in both the German and Italian sample. Firms belonging to the financial services industry (SIC 6000-6999) and regulated utilities (SIC 4900-4999) were excluded following Singh et al. (2003), La Rocca et al. (2009) and Monteforte and Staglianò (2015). Data for firms included in the sample were considered only if available for at least three consecutive years between 2015-2017 (La Rocca et al. 2009). In addition, to be included in the sample, firms must have financial statement and balance sheet data available on the Orbis company database. Business segment data is retrieved from secondary research through annual reports, since it was not available on the Orbis company database. Outliers, recognized as extreme values were detected and deleted from the samples by SPSS using a step of 1.5*Interquartile range to ensure the reliability of the data. The outliers of the samples need to be excluded in order to ensure the reliability of the data, since it represents the extreme values of the data set. The outliers have been detected and deleted by SPSS using a step of 1.5*Interquartile range (Field, 2009).

5.2 Sample size

There are 150 firms in the initial full sample. The German and Italian sample both consists out of 75 firms. Firms are classified as focused, moderate diversified and conglomerate depending upon the ratio of revenue from their core segment to total revenue (DOCD). Product diversification is distinguished using the specialization ratio of Rumelt (1974). A focused firm is defined if its operates in a single business segment with a ratio equal or above 0.95. A medium diversified firm is defined by a ratio lower than 0.95 and higher or equal to 0.75. And lastly, a conglomerate operating in multiple businesses is defined by a ratio below 0.75. The value of this ratio will be used as an independent variable. In the statistical analysis, panel data is used since this study uses both time series and cross-sectional data. When using panel data, a variable in 1 year requires the elimination of the firm in the entire period (Singh et al., 2003; La Rocca et al., 2009). This study did not assess firms that were involved in abnormal financial situations (Monteforte & Staglianò, 2015). As a result, the full sample in this study consists out of 133 firms, the German sample consists out of 70 firms and the Italian sample consists out of 63 firms that meet the complete data criteria.Following is a breakdown of the full sample into various categories according to the degree of product diversification and country.

Table 2 Breakdown full sample into clusters sorted by degree of product diversification

Year	Full sample			Total
	Focused	Moderate	Conglomerate	
2015	23	40	70	133
2016	19	46	68	133
2017	20	43	70	133

Year	Germany			Total	Italy			Total
	Focused	Moderate	Conglomerate		Focused	Moderate	Conglomerate	
2015	8	15	47	70	15	25	23	63
2016	5	20	45	70	14	26	23	63
2017	6	19	45	70	14	24	25	63

The figures 1-3 showed the sample based on the four digit primary Standard Industrial Classification codes. Nine industries were identified in this study: Public Administration, Services, Real Estate, Retail Trade, Wholesale Trade, Transportation and Public Utilities, Manufacturing, Construction and Mining.

Figure 1 Full sample

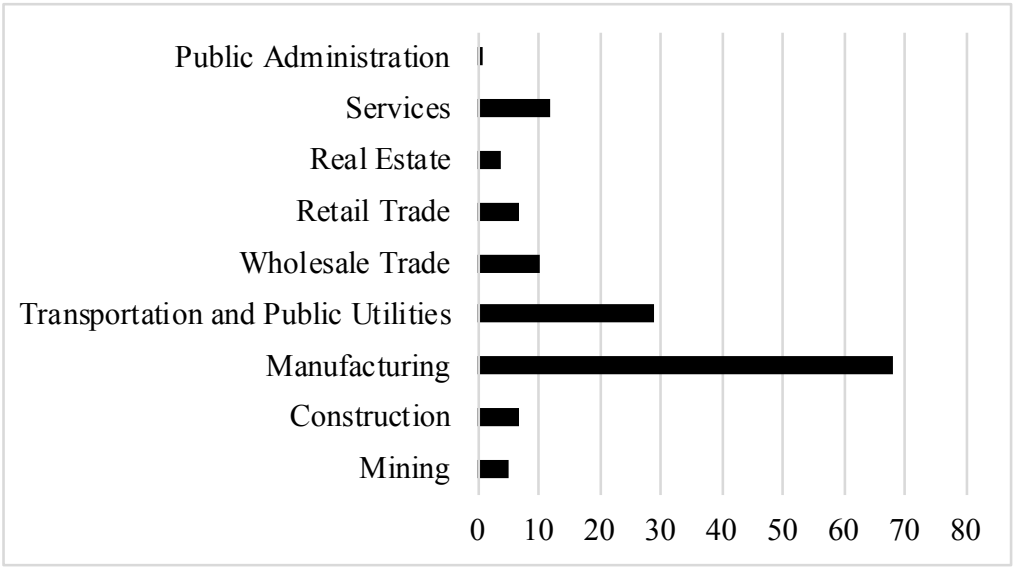

Figure 2 German sample

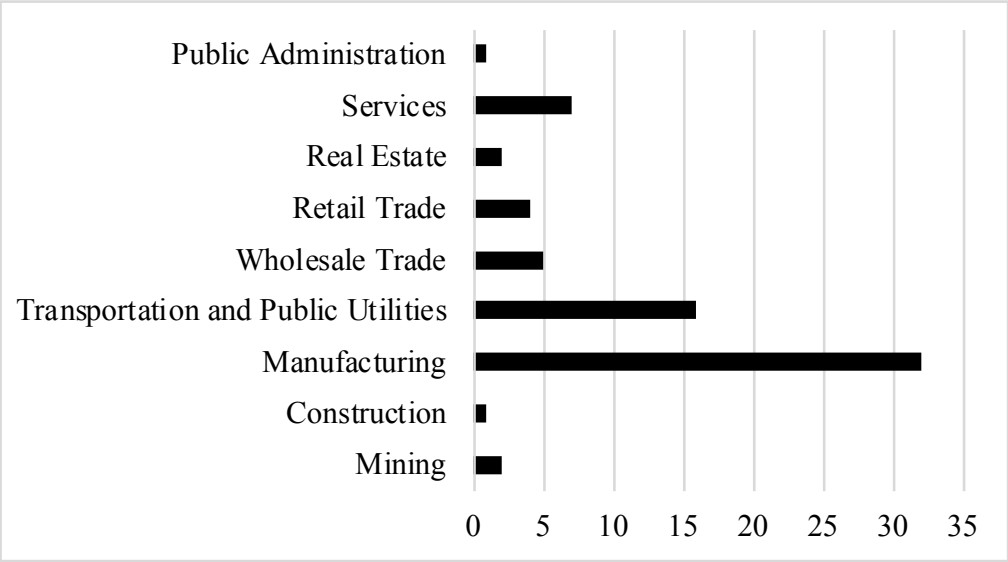

Figure 3 Italian sample

The figures 1-3 showed that the Full sample, German sample and Italian sample were comparable. Noticeable is that most firms were operating in Manufacturing with more than 50% of the total sample in all three samples. Figure 2 and 3 show that there were some differences between the German and Italian sample. For example, there were more firms operating in the service industry in Germany than in Italy. But on the other side, there were less construction firms in German than in Italy as a percentage of the complete sample per country.

6 Results

This chapter discusses the empirical results of this study by the descriptive statistics, correlation matrix, Pearson correlation, cluster analyses and regression results. Robustness tests are used to check for endogeneity issues.

6.1 Descriptive statistics

Table 3 showed the descriptive statistics of the dependent variables, independent variable and control variables. The descriptive statistics of this study will be compared with the results from previous studies of La Rocca et al. (2009) and Monteforte and Stagliano (2015).

Table 3 Descriptive statistics

Variable	N	MEAN	SD	MIN	MAX	P25	P50	P75
Full sample								
LEV	399	1.90	1.10	0.34	6.96	1.10	1.62	2.39
ALT_LEV	399	0.61	0.13	0.25	0.87	0.52	0.62	0.71
DOPD	399	0.68	0.22	0.23	1.00	0.50	0.67	0.89
GROW	399	1.07	0.17	0.19	2.50	1.00	1.05	1.10
NDTS	399	0.04	0.03	0.00	0.21	0.03	0.04	0.05
ROA	399	0.07	0.048	-0.12	0.26	0.04	0.06	0.09
LOG_SIZE	399	15.43	1.47	12.29	19.36	14.36	15.34	16.34
TANG	399	0.55	0.20	0.07	0.98	0.38	0.56	0.71
German sample								
LEV	210	1.93	1.18	0.34	6.96	1.11	1.60	2.45
ALT_LEV	210	0.61	0.13	0.25	0.87	0.53	0.62	0.71
DOPD	210	0.61	0.22	0.23	1.00	0.45	0.58	0.78
GROW	210	1.07	0.13	0.62	1.78	1.00	1.06	1.11
NDTS	210	0.04	0.02	0.00	0.14	0.03	0.04	0.05
ROA	210	0.07	0.05	-0.12	0.25	0.05	0.06	0.09
LOG_SIZE	210	16.04	1.24	13.93	19.36	15.02	15.80	17.01
TANG	210	0.56	0.19	0.12	0.98	0.40	0.56	0.71
Italian sample								
LEV	189	1.85	1.00	0.38	5.68	1.10	1.63	2.35
ALT_LEV	189	0.61	0.013	0.27	0.85	0.52	0.62	0.70
DOPD	189	0.76	0.21	0.27	1.00	0.62	0.79	0.94
GROW	189	1.06	0.20	0.19	2.50	1.00	1.05	1.10
NDTS	189	0.04	0.03	0.00	0.21	0.03	0.04	0.05
ROA	189	0.06	0.05	-0.10	0.26	0.04	0.06	0.08
LOG_SIZE	189	14.76	1.41	12.29	18.90	13.80	14.46	15.63
TANG	189	0.53	0.21	0.07	0.85	0.34	15.63	0.71

Notes: This table presents summary statistics of the used variables in this study. P25, P50, and P75 = 25th, 50th and 75th percentile of the variables. N is the number of observations.

To begin with the dependent variable, capital structure, measured by LEV and ALT_LEV. A higher LEV means that a firm has more debt relative to its equity in their capital structure. This study showed that on average LEV is comparable for Italy and Germany with a mean of 1.93 and 1.85 and median of 1.60 and 1.63. LEV is not measured by previous studies in an Italian or German sample. This study illustrated that on average, German and Italian firms were not over-leveraged. German and Italian firms had on average less than twice as much debt than equity in their capital structure. La Rocca et al. (2009) and Monteforte and Staglianò (2015) measured leverage as the total debt relative to the total assets which was measured as ALT_LEV in this study. A higher ALT_LEV means that a firm has more debt in comparison to its total assets. ALT_LEV was on average 0.61 in Germany with a median of 0.62 and 0.61 in Italy with a median of 0.62. Notable is that ALT_LEV in the German and Italian sample were similar. This is in line with Monteforte and Staglianò (2015) who found an average ALT_LEV of 0.64 with a median of 0.18. La Rocca et al. (2009) found an average ALT_LEV of 0.45 with a median of 0.45 which was lower than the average in this study and the study of Monteforte and Staglianò (2015).

The independent variable, corporate diversification, measured by DOPD showed a mean of 0.68 with a median of 0.67 in the full sample. The German sample indicated a mean of 0.61 with a median of 0.58. The Italian sample had a higher mean than German sample with a value of 0.76 and a median of 0.78. This means that on average, German firms were more diversified. These findings did not find similarities with previous research. Monteforte and Stagliano (2015) found an average DOPD in their Italian sample of 0.63 which is lower than the results in this study.

Considering the control variables, the average of GROW in the full sample is 1.07 with a median of 1.05. The German and Italian samples had almost comparable growth rates of 1.07 and 1.06 with medians of 1.06 and 1.05. The average Italian growth rate was similar with the findings of La Rocca et al. (2009). Jensen and Meckling (1976) in La Rocca et al. (2009) wrote that firms with high leverage may miss market opportunities because investment effectively transfers wealth from the equity holders to the debt holders. Therefore, higher leveraged firms were expected to have a lower GROW value. This was not in line with the findings in this study. Italian firms had on average a lower LEV value than German firms and had a lower GROW value which is not line with previous research.

Non-debt tax shields had a mean in the full sample of 0.04 with a median of 0.04. The German sample showed similar results. The Italian sample showed a mean of 0.04 with a median of 0.03. These results were in line with the work of La Rocca et al. (2009) who found a mean of 0.06 and a median of 0.05.

Return on assets was measured by the variable ROA. The full sample showed a mean of 0.07 with a median of0.06. The German sample expressed a mean of 0.07 with a median of 0.06 in comparison with a mean of 0.06 in Italy with a mean of 0.06 and a similar median. This means that firms in Germany were on average slightly more profitable than Italian firms. The results of this study were aligned with the results of La Rocca et al. (200). However, the results between the German and Italian sample were comparable, but the differences in LEV and ALT_LEV did not seem to impact the values of ROA. Therefore, the descriptive statistics did not show an explanation

trough the pecking order theory or trade-off theory. Firm size was measured by SIZE. The full sample indicated a mean of 15.43 and a median of 15.34. German firms were on average considerable larger than Italian firms with a mean of 16.04 and a median of 15.80 in comparison with a mean of 14.76 and a median of 14.46. La Rocca et al. (2009) and Monteforte and Staglianò (2015) found higher means in their Italian sample which was approximately 20. These results were contradicted with this study.

The last control variable, tangibility is measured by TANG. The full sample had a mean of 0.55 and a median of 0.56. TANG was a bit higher in Germany than in Italy with a mean of 0.56 and median of 0.56 compared with a mean of 0.53 and a median of 0.56. TANG and LEV showed a reversed relationship which was not in line with previous findings of Titman and Wessels (1988) and Rajan and Zingales (1995).

6.2 Pearson correlation matrix

Table 4.1 to 4.3 presented the Pearson correlation matrixes for the variables in this study sorted by the three sample, namely full sample, German sample and Italian sample. The correlation matrix enabled this study to control for multicollinearity. Evaluating the results in the tables 4.1-4.3 showed that there are no multicollinearity issues in the sample between variables. Firstly, the main results from the correlation matrixes will be highlighted.

Regarding the firm leverage measures, the variables LEV and ALT_LEV are highly correlated with each other at the 5% level in the German (r=0.90**) and Italian sample (r=0.92**). LEV and ALT_LEV showed similar results in the complete sample. Noticeable is that leverage values were comparable across all degrees of product diversification. In contradict to the first hypothesis regarding the impact of corporate diversification on the capital structure, there seems to be no relation between the degree of product diversification and leverage, because the correlation in the full sample, German sample and Italian sample showed insignificant results with LEV and ALT_LEV. Some significant results were noticed, but were too inconsistent to make conclusions. As an example, DOPD had a negative significant relation with LOG_SIZE (r=-0.18**) in the German sample (focused firms), meaning that any increase in DOPD results in a decrease in the size of an organization.

Furthermore, the control variables. GROW showed no significant correlation with other variables in the complete German sample. GROW had a significant negative relation with LOG_SIZE in the Italian complete sample (r=-0.16*). In the subsample regarding degrees of product diversification. GROW showed significant results in the German sample (r=-0.47*) for focused firms and (r=0.34*) for moderate diversified firms. The Italian sample did not show significant results for GROW with other variables, meaning that an increase of GROW does not lead to an increase or decrease in any of the other variables.

NDTS showed several significant correlations with ROA, LOG_SIZE and TANG in all three complete samples. NDTS was negative yet significantly correlated with ROA in all three complete samples, meaning that an increase in NDTS results into lower profitability for firms. ROA was negative statistically significant related to LEV (r=-0.19**) and ALT_LEV (r=-0.31**) in

the German sample. Results from Italian sample showed similar negative statistically significant results with LEV (r=-0.19*) and ALT_LEV (-0.24**). This suggests that profitable firms in the German and Italian sample had less leverage. This relates to the pecking order theory. Debt finance is replaced by internal finance of profitable firms. Size was positive statistically significant related to LEV (r=0.15**), ALT_LEV (r=0.20**) and TANG (r=0.04**) in the full complete sample. Suggesting that larger firms have more collateralizable assets and more stable cash flows, therefore larger firms were expected to carry more debt which is in line with the results found in this study. The German sample indicated similar results regarding ALT_LEV (0.19**) TANG (r=0.54**).

LOG_SIZE was statistical significant with all variables in the complete Italian sample except of DOPD. The relation was positive significant with LEV (r=0.20)**, ALT_LEV (0.26**), NDTS (0.21**), and TANG (0.38**). There was a negative yet significant correlation with GROW (r=-0.16*) and ROA (-0.19**), meaning that larger organizations were less profitable. Lastly, TANG was positively and statistically significant with LOG_SIZE (r=0.54**) in Germany and (r=0.38**) in Italy, suggesting that larger firms have more collateralizable assets. Additional tests have been conducted to test for multicollinearity issues. Variance inflation factors have been calculated for all variables to test for multicollinearity. Multicollinearity occurs when there are high correlations between independent and control variables.

Table 4.1 Pearson correlation matrix - Full sample

Full sample - Complete								
N =399	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.91**	1						
DOPD	0.02	0.03	1					
GROW	-0.07	-0.08	0.02	1				
NDTS	0.01	0.04	0.01	-0.13**	1			
ROA	-0.19**	-0.28**	0.01	0.09	-0.17**	1		
LOG_SIZE	0.15**	0.20**	-0.21**	-0.10*	-0.10*	-0.11*	1	
TANG	-0.06	-0.03	-0.06	0.06	0.06	-0.06	0.044**	1
Full sample - Focused firms								
N = 62	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.93**	1						
DOPD	-0.08	-0.05	1					
GROW	-0.12	-0.16	-0.18	1				
NDTS	0.05	0.08	-0.02	-0.10	1			
ROA	-0.04	-0.08	-0.07	0.14	-0.59**	1		
LOG_SIZE	0.07	0.04	0.10	-0.14	0.32*	-0.25	1	
TANG	0.28*	0.26*	-0.35**	0.03	0.37**	-0.24	0.28*	1
Full sample - Focused firms								
N = 129	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.91**	1						
DOPD	-0.27*	-0.21	1					
GROW	-0.16	-0.12	-0.06	1				
NDTS	0.08	0.08	0.03	-0.19	1			
ROA	-0.15	-0.27*	-0.003	0.29*	-0.26*	1		
LOG_SIZE	0.06	0.02	0.09	-0.17	-0.01	-1.3	1	
TANG	-0.49	-0.04	0.14	-0.02	0.11	-0.07	0.65**	1
Full sample - Conglomerates								
N = 208	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.91**	1						
DOPD	0.001	-0.02	1					
GROW	-0.09	-0.13	0.02	1				
NDTS	-0.06	-0.01	-0.16*	-0.15*	1			
ROA	-0.21**	-0.31**	-0.01	0.01	0.03	1		
LOG_SIZE	0.11	0.24**	-0.18*	-0.07	0.09	-0.14*	1	
TANG	-0.16**	0.12	-0.10	0.11	0.06	-0.13	0.52**	1

Notes: This table presents Pearson's correlation between the variables used in this study. The full sample consists out of 429 firm-year observations, the German sample consists out of 210 firm-year observations and the Italian sample consists out of 219-firm year observations from 2015-2017. Significant at 0.05 or better (2-tailed). ** Significant at 0.01 or better (2-tailed).*

Table 4.2 Pearson correlation matrix - German sample

German sample - Complete								
N = 210	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.90**	1						
DOPD	0.04	-0.02	1					
GROW	-0.08	-0.06	0.06	1				
NDTS	0.02	0.04	-0.06	-0.08	1			
ROA	-0.19**	-0.31**	0.05	0.10	-0.15*	1		
LOG_SIZE	0.11	0.19**	-0.15*	-0.07	0.03	-0.010	1	
TANG	-0.02	0.04	-0.09	0.02	0.10	-0.02	0.54**	1
German sample - Focused firms								
N = 19	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.93**	1						
DOPD	0.20	0.09	1					
GROW	-0.13	-0.22	0.23	1				
NDTS	-0.04	-0.03	-0.29	0.32	1			
ROA	0.67**	0.73**	-0.19	-0.47*	-0.47*	1		
LOG_SIZE	0.07	0.18	-0.50*	-0.33	0.58**	-0.04	1	
TANG	0.47*	0.34	-0.33	-0.10	0.59**	0.12	0.42	1
German sample - Moderate diversified firms								
N = 54	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.91**	1						
DOPD	-0.23	-0.19	1					
GROW	-0.17	-0.10	0.001	1				
NDTS	0.10	0.08	-0.09	-0.14	1			
ROA	-0.09	-0.21	-0.12	0.34*	-0.34*	1		
LOG_SIZE	0.07	-0.004	0.04	-0.16	-0.02	-0.04	1	
TANG	-0.03	-0.02	0.10	-0.01	0.12	-0.03	0.59**	1
German sample - Conglomerates								
N = 137	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.90**	1						
DOPD	0.08	0.06	1					
GROW	-0.01	0.03	-0.01	1				
NDTS	-0.05	0.01	-0.10	-0.09	1			
ROA	-3.53**	-0.46**	-0.02	0.06	-0.01	1		
LOG_SIZE	0.11	0.23**	-0.26**	0.01	-0.04	-0.11	1	
TANG	-0.18*	-0.07	-0.15	0.13	-0.04	0.002	0.52**	1

Notes: This table presents Pearson's correlation between the variables used in this study. The full sample consists out of 429 firm-year observations, the German sample consists out of 210 firm-year observations and the Italian sample consists out of 219-firm year observations from 2015-2017. Significant at 0.05 or better (2-tailed). ** Significant at 0.01 or better (2-tailed).*

Table 4.3 Pearson correlation matrix - Italian sample

Italian sample - Complete								
N = 189	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.92**	1						
DOPD	0.02	0.10	1					
GROW	-0.07	-0.11	0.003	1				
NDTS	0.00	0.03	0.08	-0.16	1			
ROA	-0.19**	-0.24**	-0.004	0.09	-0.19*	1		
LOG_SIZE	0.20**	0.26**	0.001	-0.16*	0.21**	-0.19**	1	
TANG	-0.109	-0.09	0.01	0.09	0.33**	-0.11	0.38**	1
Italian sample - Focused firms								
N = 43	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.95**	1						
DOPD	-0.18	-0.05	1					
GROW	-0.12	-0.10	-0.26	1				
NDTS	0.07	0.09	0.03	-0.12	1			
ROA	-0.44**	-0.46**	-0.09	0.22	-0.62**	1		
LOG_SIZE	0.16	0.14	0.21	-0.20	0.37*	0.48**	1	
TANG	0.17	0.09	-0.34	0.11	0.32*	-0.31*	0.42**	1
Italian sample - Moderate diversified firms								
N = 75	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.93**	1						
DOPD	0.32**	0.29*	1					
GROW	0.09	0.08	0.04	1				
NDTS	0.01	0.06	0.19	-0.18	1			
ROA	-0.34**	-0.38**	-0.17	0.12	0.01	1		
LOG_SIZE	0.33**	0.34**	0.18	0.17	0.15	-0.01	1	
TANG	-0.10	-0.07	0.02	0.07	0.49**	0.15	0.29*	1
Italian sample - Conglomerates								
N = 71	LEV	ALT_LEV	DOPD	GROW	NDTS	ROA	LOG_SIZE	TANG
LEV	1							
ALT_LEV	0.92**	1						
DOPD	-0.13	-0.13	1					
GROW	-0.21	-0.35**	0.07	1				
NDTS	-0.08	-0.06	-0.27*	-0.27*	1			
ROA	0.03	-0.02	0.05	-0.08	0.12	1		
LOG_SIZE	0.11	0.24*	0.13	-0.17	0.26*	-0.27*	1	
TANG	-0.22	-0.22	0.02	0.09	0.28	-0.39**	0.51**	1

*Notes: This table presents Pearson's correlation between the variables used in this study. The full sample consists out of 429 firm-year observations, the German sample consists out of 210 firm-year observations and the Italian sample consists out of 219-firm year observations from 2015-2017. * Significant at 0.05 or better (2-tailed). ** Significant at 0.01 or better (2-tailed).*

6.3 Cluster analyses

This study analyzed the impact of corporate diversification on leverage and the differences in impact across degrees of corporate diversification between clusters of firms. The full sample was divided into two countries and sorted into three groups according to the cluster analyzing approach (focused firms, moderate diversified and conglomerate) following Singh et al. (2003), La Rocca et al. (2009) and Monteforte and Staglianò (2015). To begin with, table 5 shows a comparison of debt ratios across countries and the degree of product diversification to find out if there are structural differences within the samples.

Table 5 Mean comparisons of debt ratios across countries and degree of product diversification for the years 2015-2017

	LEV			ALT_LEV		
Panel A: 2015	Germany[a]	Italy[b]	Mean difference[c]	Germany	Italy	Mean difference
Focused firms	1.60	1.97	-0.77	0.55	0.63	-1.48
Moderate diversified	2.40	1.93	1.13**	0.64	0.62	0.46
Conglomerates	1.97	1.86	0.39	0.62	0.59	0.85
f-statistic[d]	1.03	0.45		1.35	0.58	
Panel B: 2016	Germany	Italy	Mean difference	Germany	Italy	Mean difference
Focused firms	1.59	1.74	-0.37	0.56	0.62	-1.09
Moderate diversified	2.34	1.97	1.04	0.65	0.62	0.67
Conglomerates	1.86	1.83	0.09	0.61	0.59	0.58
f-statistic	1.51	1.03		1.51	2.82	
Panel C: 2017	Germany	Italy	Mean difference	Germany	Italy	Mean difference
Focused firms	1.62	1.76	0.12	0.57	0.63	-1.33
Moderate diversified	1.93	1.76	0.56	0.61	0.60	0.45
Conglomerates	1.77	1.82	-0.21	0.60	0.60	0.06
f-statistic	0.26	0.04		0.35	0.27	

[a] The average debt ratio (1.60) of firms that are both German and focused. [b] The average debt ratio of (1.97) of firms that are both Italian and focused, etc. [c] The mean difference *compares the average debt ratios of German and Italian firms. [d] The f-statistic compares average debt ratios by the degree of product diversification per country. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

The comparison of the debt ratios measured by LEV and ALT_LEV yield interesting results. Only one comparison out of the 18 mean comparisons in total expressed a significant result. There were no statistically significant differences between means measured using ALT_LEV. There were no statistically significant differences within the countries (*f*-statistic), divided by the degree of corporate diversification and the year. One comparison of the focused firms group measured by LEV showed that there is a significant difference, namely focused firms between Germany and Italy in 2015 (t=1.13**). On average, Italian firms had a higher leverage ratio than German firms. To

highlight the differences, the highest LEV in Germany was 2.40 in comparison with 1.97 in Italy. The highest ALT_LEV of Germany was 0.65 and 0.63 in Italy.

To conclude, the mean comparison of debt ratios across countries and the degree of corporate diversification showed there were only statistically significant differences in the mean of focused firms using ALT_LEV. There were no differences in the moderate diversified and conglomerates with a statistically significant mean difference. These results were in line with the work of Singh et al. (2003). An important finding in table 4 was that the leverage ratio did not depends on the degree of product diversification. There was no clear trend recognized for rising or falling leverage ratios of the years 2015-2017 in the German or Italian sample.

6.4 Regression results

The results of the OLS regression analysis has been presented in table 6, 7 and 8. The first OLS regression or baseline model, shown in table 6 consists of the dependent variable LEV and ALT_LEV sorted by country across three years (2015-2017) and shows the OLS regression model for hypothesis 1. The second OLS regression, shown in table 7 extents the baseline model of table 6 by the use of alternative combinations of control variables. Table 8 consists out of the dependent variable LEV and ALT_LEV sorted by the degree of product diversification and country and shows the OLS regression model for hypothesis 2.

The results in general, regarding the control variables indicated that leverage is a negative function of ROA and TANG, and a positive function for LOG_SIZE. This suggests that larger, more profitable firms with less collateralized assets have a larger debt capacity than smaller, less profitable firms with more collateral. TANG showed diverse significant results and were not consistent positive or negative significant related. The growth of a firm (GROW) was sometimes significant related to leverage, suggesting that a firm's growth rate has a positive impact on leverage. La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003) found similar results in their studies.

6.4.1 Impact of corporate diversification on capital structure

The first hypothesis stated that corporate diversification has a positive impact on the capital structure. Table 6 presented the results for the full sample, German sample and Italian sample measured by the debt-to-equity ratio (LEV) and total debt divided by total assets ratio (ALT_LEV). As can be observed in the table, the coefficient of degree of product diversification is positive and insignificant related when LEV is the dependent variables in the full sample (β=0.23, t=0.89). Using ALT_LEV as a dependent variable, the degree of product diversification is positive and non-significant (β=0.03, t=1.07). The German and Italian samples did not show any significant result regarding the degree of product diversification on leverage. Firstly, focusing on the German sample, the coefficients of the degree of product diversification is positive non-significant when LEV is the dependent variable and is insignificant negative when ALT_LEV is the dependent variables (β=0.21, t=0.55) and (β=-0.0004, t=-0.11). Secondly, the coefficients in the Italian sample showed similar non-significant results for the degree of product diversification. Using LEV as a dependent

variable, there is an insignificant positive relationship (β=0.12, t=0.35). Using ALT_LEV as a dependent variable, the relationship with the degree of product diversification showed an insignificant positive value as well (β=0.06, t=1.45). The findings suggested that corporate diversification did not have a significant impact on the capital structure of German and Italian firms. In addition, there were no significant differences between LEV and ALT_LEV by yielding comparable results. Both Germany and Italy illustrated positive yet insignificant results. The positive DOPD values in Germany and Italy means that there was in fact a positive impact, but a minor impact. These results were not in line with previous research of La Rocca et al. (2009) and Singh et al. (2003), who found a negative insignificant impact. These results support the arguments that corporate diversification is in fact not associated with an increased debt capacity in the capital structure of firms. Since there were no significant results, hypothesis 1 is rejected. This result is in line with the previous study of Singh et al. (2009).

In addition, table 6 showed that profitable firms, measured by return on assets have less leverage. The full sample, German sample and Italian sample showed negative significant results on a 1% level of significance using LEV and ALT_LEV. A negative relationship with return on assets and leverage was expected. Profitable firms are likely to substitute debt for internal funds due to the pecking order theory (Singh et al., 2003; La Rocca et al., 2009). This contradicts the theory by Harris and Raviv (1991) who stated that profitable firms prefer debt in order to benefit from a tax shield. Therefore, due to the trade-off theory, higher leverage was expected.

Firm size is positively and significant related to leverages in the full sample, German sample and Italian sample, meaning that larger firms, measured by the natural log of their total assets have higher assets. This can be explained by the theory of Diamond (1989) and La Rocca et al. (2009). Larger firms have more collateralized assets and might have a better reputation on the debt markets which results in higher debt. Jensen and Meckling (1976) stated that the cost of debt will increase if an organization cannot collateralize their assets. Titman and Wessels (1988) and Rajan and Zingales (1995) found evidence that firms with more tangible assets provide better collateral for loans. Hence, tangibility was expected to be positively related to leverage. However, table 6 shows negative values for all three samples. Noticeable is that tangibility is significantly negative related to leverage in Italy, but not in Germany. Meaning that an increase in tangible assets within a firm decreases their leverage which contradicts the previous findings of Titman and Wessels (1988) and Rajan and Zingales (1995).

Regarding the year control. Dummy variable YEAR_2016 and YEAR_2015 showed insignificant results in all three samples, meaning that there was no differences between the years and their impact on leverage. The industry dummy IND shows that there were no significant differences using LEV between the years 2015-2017 and their impact on leverage. Using ALT_LEV, the industry variable showed that all segments except of manufacturing firms had a significant positive impact on leverage.

Table 6 OLS regression: dependent variable equals LEV and ALT_LEV sorted by country across three years

Regression description	Full sample	German sample	Italian sample
Regression	1	2	3
	LEV	LEV	LEV
DOPD	0.23 (0.89)	0.21 (0.55)	0.12 (0.35)
GROW	-0.33 (-1.02)	-0.67 (-1.06)	0.07 (0.19)
NDTS	-0.94 (-0.44)	-0.41 (-0.12)	-0.31 (-0.11)
ROA	-4.07*** (-3.53)	-3.57** (-2.00)	-3.41** -2.29
LOG_SIZE	0.05*** (2.76)	0.10 (1.24)	0.19*** (3.30)
TANG	-0.56* (-1.95)	-0.61 (-1.18)	-1.03*** (-2.67)
YEAR_2016	0.08 (0.63)	0.10 (0.50)	0.07 (0.41)
YEAR_2015	0.15 (1.10)	0.21 (1.06)	0.12 (0.70)
IND	0.15 (1.33)	0.29 (1.65)	-0.12 (-0.78)
Adjusted R2	0.051	0.035	0.066
N	399	210	189
Regression number	4	5	6
DOPD	0.03 (1.07)	-0.004 (-0.11)	0.06 (1.45)
GROW	-0.05 (-1.21)	-0.03 (-0.37)	-0.01 (-0.29)
NDTS	-0.08 (-0.31)	-0.003 (-0.01)	-0.03 (-0.08)
ROA	-0.70*** (-5.25)	-0.72*** (-3.76)	-0.54*** (-2.91)
LOG_SIZE	0.01*** (2.70)	0.02* (1.81)	0.03*** (3.77)
TANG	-0.05 (-1.59)	-0.05 (0.88)	-0.14*** (-2.87)
YEAR_2016	0.003 (1.67)	0.01 (0.37)	0.001 (0.07)
YEAR_2015	0.01 (0.36)	0.01 (0.41)	0.01 (0.26)
IND	0.03** (2.22)	0.03* (1.73)	0.003 (0.14)
Adjusted R^2	0.096	0.099	0.121
N	399	210	189

*Notes: This table presents the OLS regression results. Table reports the unstandardized coefficients. Figures in parentheses represent the t-statistics. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

The tables 7a-7c show OLS regressions with alternative combinations of variables and their impact on leverage. Model 7 is identical with table 6. Model 1-6 regress all the variables individually to measure their effect on the dependent variable LEV and ALT_LEV. Table 7a consists out of the full sample with alternative combinations of variables, table 7b includes the German sample and lastly, table 7c includes the Italian sample.

Table 7a OLS regression: dependent variable equals LEV and ALT_LEV based on full sample across three years with alternative combinations of control variables

Regression description	Full sample						
	Model 1 LEV	Model 1 LEV	Model 3 LEV	Model 4 LEV	Model 5 LEV	Model 6 LEV	Model 7 LEV
DOPD	0.003						0.23
	(0.01)						(0.89)
GROW		-0.50					-0.33
		(-1.53)					(-1.02)
NDTS			-0.04				-0.94
			(-0.02)				(-0.44)
ROA				-3.92***			-4.07***
				(-3.43)			(-3.53)
LOG_SIZE					0.04**		0.05***
					(2.16)		(2.76)
TANG						-0.44	-0.56*
						(-1.57)	(-1.95)
YEAR_2016	0.13	0.11	0.13	0.10	0.14	0.13	0.08
	(1.00)	(0.81)	(1.00)	(0.74)	(1.031)	(1.01)	(0.63)
YEAR_2015	0.18	0.18	0.18	0.15	0.18	0.17	0.15
	(1.30)	(1.31)	(1.30)	(1.10)	(1.33)	(1.29)	(1.10)
IND	0.23**	0.24**	0.23**	0.16***	0.20**	0.26**	0.15
	(2.06)	(2.17)	(2.07)	(1.46)	(1.78)	(2.32)	(1.33)
Adjusted R^2	0.005	0.011	0.005	0.034	0.017	0.012	0.051
	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV
DOPD	0.004						0.03
	(1.38)						(1.07)
GROW		-0.07					-0.05
		(-0.07)*					(-1.21)
NDTS			0.12				-0.08
			(0.48)				(-0.31)
ROA				-0.68***			-0.70***
				(-5.21)			(-5.25)
LOG_SIZE					0.004**		0.01***
					(2.04)		(2.70)
TANG						-0.04	-0.05
						(-1.14)	(-1.59)
YEAR_2016	0.01	0.01	0.01	0.01	0.01	0.01	0.003
	(0.69)	(0.47)	(0.68)	(0.31)	(0.70)	(0.70)	(1.67)
YEAR_2015	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.67)	(0.68)	(0.66)	(0.37)	(0.70)	(0.66)	(0.36)
IND	0.04***	0.04***	0.04***	0.03**	0.04***	0.05***	0.03**
	(3.28)	(3.44)	(3.28)	(2.45)	(3.04)	(3.48)	(2.22)
Adjusted R^2	0.019	0.027	0.019	0.082	0.029	0.022	0.096

*Notes: This table presents the OLS regression results. Table reports the unstandardized coefficients. Figures in parentheses represent the t-statistics. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

Table 7b OLS regression: dependent variable equals LEV and ALT_LEV based on German sample across three years with alternative combinations of control variables

Regression description	Full sample						
	Model 1 LEV	Model 1 LEV	Model 3 LEV	Model 4 LEV	Model 5 LEV	Model 6 LEV	Model 7 LEV
DOPD	0.08						0.21
	(0.21)						(0.55)
GROW		-0.88					-0.67
		(-1.42)					(-1.06)
NDTS			0.53				-0.41
			(0.16)				(-0.12)
ROA				-3.80**			-3.57**
				-(2.18)			(-2.00)
LOG_SIZE					0.05		0.10
					(0.79)		(1.24)
TANG						-0.33	-0.61
						(-0.75)	(-1.18)
YEAR_2016	0.18	0.12	0.18	0.14	0.18	0.18	0.10
	(0.91)	(0.61)	(0.91)	(0.74)	(0.91)	(0.90)	(0.50)
YEAR_2015	0.22	0.24	0.22	0.19	0.22	0.22	0.21
	(1.10)	(1.20)	(1.09)	(0.96)	(1.13)	(1.09)	(1.06)
IND	0.41**	0.43***	0.42***	0.33**	0.38**	0.44***	0.29
	(2.55)	(2.70)	(2.59)	(2.00)	(2.23)	(2.69)	(1.65)
Adjusted R^2	0.020	0.029	0.019	0.042	0.022	0.022	0.035
	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV
DOPD	-0.03						-0.004
	(-0.74)						(-0.11)
GROW		-0.07					-0.03
		(-1.01)					(-0.37)
NDTS			0.20				-0.003
			(0.54)				(-0.01)
ROA				-0.75***			-0.72***
				(-3.98)			(-3.76)
LOG_SIZE					0.01		0.02*
					(1.73)*		(1.81)
TANG						7.78E-5	-0.05
						(0.999)	(0.88)
YEAR_2016	0.02	0.01	0.16	0.01	0.02	0.02	0.01
	(0.74)	(0.53)	(0.74)	(0.44)	(0.76)	(0.74)	(0.37)
YEAR_2015	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.60)	(0.66)	(0.56)	(0.33)	(0.65)	(0.59)	(0.41)
IND	0.06***	0.06***	0.06***	0.04**	0.05***	0.06***	0.03*
	(3.37)	(3.37)	(3.29)	(2.31)	(2.62)	(3.26)	(1.73)
Adjusted R^2	0.037	0.039	0.036	0.10	0.05	0.035	0.099

*Notes: This table presents the OLS regression results. Table reports the unstandardized coefficients. Figures in parentheses represent the t-statistics. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

Table 7c OLS regression: dependent variable equals LEV and ALT_LEV based on Italian sample across three years with alternative combinations of control variables

Regression description	Full sample						
	Model 1 LEV	Model 1 LEV	Model 3 LEV	Model 4 LEV	Model 5 LEV	Model 6 LEV	Model 7 LEV
DOPD	0.06						0.12
	(0.17)						(0.35)
GROW		-0.33					0.07
		(-0.90)					(0.19)
NDTS			-0.06				-0.31
			(-0.02)				(-0.11)
ROA				-3.88***			-3.41**
				(-2.61)			-2.29
LOG_SIZE					0.16***		0.19***
					(2.88)		(3.30)
TANG						-0.54	-1.03***
						(-1.53)	(-2.67)
YEAR_2016	0.08	0.07	0.09	0.05	0.09	0.09	0.07
	(0.47)	(0.41)	(0.47)	(0.28)	(0.50)	(0.50)	(0.41)
YEAR_2015	0.13	0.12	0.13	0.10	0.14	0.13	0.12
	(0.70)	(0.67)	(0.71)	(0.58)	(0.82)	(0.69)	(0.70)
IND	0.01	0.02	0.02	-0.02	-0.12	0.06	-0.12
	(0.08)	(0.15)	(0.10)	(-0.16)	(0.82)	(0.38)	(-0.78)
Adjusted R^2	-0.02	-0.014	-0.019	0.017	0.025	-0.006	0.066
	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV
DOPD	0.05						0.06
	(1.18)						(1.45)
GROW		-0.07					-0.01
		(1.53)					(-0.29)
NDTS			0.09				-0.03
			(0.28)				(-0.08)
ROA				-0.62***			-0.54***
				(-3.28)			(-2.91)
LOG_SIZE					0.02		0.03***
					(3.41)***		(3.77)
TANG						-0.07	-0.14***
						(-1.53)	(-2.87)
YEAR_2016	0.01	0.003	0.01	0.00	0.01	0.01	0.001
	(0.21)	(0.12)	(0.21)	(-0.10)	(0.26)	(0.26)	(0.07)
YEAR_2015	0.01	0.01	0.01	0.004	0.01	0.01	0.01
	(0.32)	(0.29)	(0.35)	(0.19)	(0.47)	(0.34)	(0.26)
IND	0.02	0.03	0.03	0.02	0.004	0.03	0.003
	(1.16)	(1.43)	(1.29)	(1.03)	(0.23)	(1.60)	(0.14)
Adjusted R^2	-0.004	0.001	-0.011	0.045	0.049	0.001	0.121

*Notes: This table presents the OLS regression results. Table reports the unstandardized coefficients. Figures in parentheses represent the t-statistics. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

The tables show similar significant results with return on assets, firm size and tangibility and similar insignificant results for the degree of product diversification compared with table 6. Hence, using alternative combinations of control variables hypothesis 1 is still rejected. Just as in table 6, the dummy variable of 2017 is excluded from the OLS regression since it does not provide any additional information due to multicollinearity. There were no differences between the years and their impact on leverage.

The industry dummy was significantly and positively related to the dependent variable while control the other variables individually in the full sample and German sample. Nevertheless, after controlling all the variables, the effect of the industry dummy was not significant anymore. One possible possible reason is that the effect of most control variables were much stronger than the industry dummy, therefore, when all the control variables in one regression model, the influence of industry dummy can be neglected. Noticeable is that the Italian sample shows some negative adjusted R^2 values. Field (2009) explained that the adjusted R^2 can be defined as the proportion of variance explained by the fit of a model. In this case, some alternative combinations of variables show a fit that is actually worse than just fitting a horizontal line with a value of 0. Basically, the alternative combinations of variables with a negative adjusted R^2 mean that the model consists terms that do not help to predict the dependent variable.

6.3.2 Impact across degrees of product diversification on capital structure

The second hypothesis stated that there were differences across degrees of product diversification (focused, moderate diversified and conglomerate) and its impact on the capital structure. The results in table 8 showed the impact on leverage across degrees of product diversification and the impact of the capital structure determinants in the full sample. Regression 1-3 were measured by LEV and regression 4-6 were measured by ALT_LEV. Table 9 presented the results of the German and Italian sample. Model 1 in table 9 represented the results for LEV (debt-to-equity ratio) and model 2 showed the results for ALT_LEV (total debt/ total assets). To begin with, for robustness, both models using (1) LEV and (2) ALT_LEV as a dependent variable showed similar results regarding the impact of the independent variables and firm-specific control variables.

Previous research by Singh et al. (2003), La Rocca et al. (2009) and Monteforte and Stagliano (2015) discovered that the capital structure depends on many firm-specific variables, and the degree of product diversification seems to reveal differences in their impact. The results in general, showed that the DOPD, ROA and TANG are negative related to leverage (LEV and ALT_LEV) and LOG_SIZE is positively related to leverage. In general, to differentiate between focused firms, moderate diversified firms and conglomerates seemed to be justified. A comparison between the three clusters of firms showed that there were relevant differences in the impact of the coefficient of the capital structure determinants showed in table 8.

Table 8 OLS regression: dependent variable equals LEV and ALT_LEV by degree of product diversification by full sample (2015-2017)

Regression description	Full sample - Focused	Full sample - Moderate	Full sample - Conglomerate	Full sample - Focused	Full sample - Moderate	Full sample - Conglomerate
Regression	1	2	3	4	5	6
	LEV	LEV	LEV	ALT_LEV	ALT_LEV	ALT_LEV
DOPD	0.60 (0.06)	-0.25 (-0.20)	0.01 (0.01)	0.23 (0.19)	0.03 (0.20)	0.0003 (0.04)
GROW	-0.57 (-1.06)	0.69 (1.14)	-0.30 (-0.61)	-0.08 (-1.26)	0.11 (1.60)	-0.06 (-1.07)
NDTS	-1.58 (-0.44)	4.33 (0.96)	-2.98 (-0.85)	-0.10 (-0.23)	0.41 (0.78)	-0.13 (-0.33)
ROA	0.08 (0.03)	-4.44** (-2.20)	-5.06*** (-3.31)	-0.06 (-0.16)	-0.82*** (-3.52)	-0.80*** (-4.71)
LOG_SIZE	-0.01 (-0.12)	0.27*** (3.55)	0.19*** (3.29)	-0.01 (-0.44)	0.03*** (3.29)	0.03*** (4.91)
TANG	1.35** (2.09)	-0.99* (-1.91)	-2.19*** (-4.48)	-0.15 (1.92)*	-0.10 (-1.64)	-0.25*** (-4.55)
Adjusted R^2	0.003	0.093	0.123	-0.002	0.135	0.204
N	62	129	208	62	129	208

*Notes: This table presents the OLS regression results. Table reports the unstandardized coefficients. Figures in parentheses represent the t-statistics. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

Table 9 OLS regression: dependent variable equals LEV and ALT_LEV by degree of product diversification and country across three years (2015-2017)

Regression description	Germany - Focused	Germany - Moderate	Germany Conglomerate	Italy - Focused	Italy - Moderate	Italy - Conglomerate
N	19	54	137	43	75	71
Regression	1	2	3	4	5	6
Model 1	LEV	LEV	LEV	LEV	LEV	LEV
DOPD	90.02*** (5.92)	-4.31 (-1.63)	0.84 (1.16)	-13.59 (-1.75)*	2.25 (1.78)*	-2.04* (-1.67)
GROW	2.68 (2.09)*	-1.50 (-0.84)	0.34 (0.56)	-0.21 (-0.50)	1.02 (1.99)*	-1.11 (1.28)
NDTS	3.15 (0.29)	2.93 (0.40)	-2.05 (-0.54)	-4.79 (-1.76)*	3.14 (0.54)	-11.06 (-1.26)
ROA	28.31*** (7.09)	-1.38 (-0.30)	-7.14*** (-4.10)	-10.16*** (-3.41)	-5.38*** (-2.91)	0.41 (0.12)
LOG_SIZE	0.30* (1.96)	0.15 (0.60)	0.22*** (2.77)	0.03 (0.26)	0.27*** (3.57)	0.24** (2.28)
TANG	2.44*** (3.20)	-0.59 (-0.43)	0.22*** (2.77)	-0.31 (0.49)	-0.87 (-1.79)*	0.24** (2.28)
Adjusted R^2	0.866	-0.020	0.174	0.203	0.273	0.101
Regression	7	8	8	10	11	12
Model 2	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV	ALT_LEV
DOPD	9.21*** (4.32)	-0.42 (-1.54)	0.11 (1.44)	-0.64 (-0.67)	0.22 (1.27)	-0.26** (-2.01)
GROW	0.16 (0.86)	-0.04 (-0.20)	0.07 (1.13)	-0.01 (-0.14)	0.15 (2.05)*	-0.24** (-2.51)
NDTS	2.59 (1.71)	-0.11 (-0.14)	0.13 (0.32)	-0.57 (-1.70)*	0.76 (0.94)	-1.59 (-1.67)
ROA	4.03*** (7.20)	-0.68 (-1.45)	-1.14*** (-6.13)	-1.31*** (-3.58)	-0.90*** (-3.49)	-0.07 (-0.20)
LOG_SIZE	0.03 (1.59)	-0.002 (-0.08)	0.03*** (3.74)	-0.003 (-0.19)	0.04*** (3.66)	0.04*** (3.58)
TANG	0.02 (0.20)	0.01 (-0.08)	-0.17*** (-2.79)	-0.02 (-0.24)	-0.11 (-1.65)	-0.30*** (-2.81)
Adjusted R^2	0.806	-0.026	0.288	0.172	0.287	0.265

*Notes: This table presents the OLS regression results. Table reports the unstandardized coefficients. Figures in parentheses represent the t-statistics. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

The negative link between ROA and leverage (LEV and ALT_LEV) indicated that the more profitable firms preferred internal finance instead of debt finance which can be explained by the pecking-order theory which was supported by the results of Singh et al. (2003) and La Rocca et al. (2009). This suggested that this preference was due to the costs associated with external financing issues by asymmetric information (La Rocca et al. (2009). Hence, the market seemed to raise doubts about the strategies based on corporate diversification, and such firms have to finance this choice through internal sources. Using LEV as a dependent variable, GROW showed a positive significant relation for German focused firms (β=2.68*, t=2.09) and Italian moderate diversified firms (β=1.02*, t=1.99). However, most clusters of firms were insignificant, which were in line with the results of La Rocca et al. (2009) and Signh et al. (2003). Using ALT_LEV as a dependent variable, Italian moderate diversified firms had a positive significant relation GROW (β=0.15, t=0.15) and Italian conglomerates had a negative significant relation with GROW (β-0.24**, t=-2.51). Italian conglomerates seemed to have less growth opportunities which can be explained by the inflexibility of larger firms (La Rocca et al. (2009). NDTS showed a negative significants result for German and Italian focused firms (β=-4.79*, t=-1.76 and β=0.57*, t=-1.70) using ALT_LEV and no significant results for by the use of LEV. It was expected to see more non-debt tax shields in

Italy than in Germany due to their complex tax system with one of the highest corporate tax rates of the Europe (La Rocca et al. (2009). However, the overall results suggested that there is no difference between the two countries. LOG_SIZE showed similar positive significant results across all degrees of product diversification using LEV and ALT_LEV, suggesting that larger firms tend to have a better reputation on the debt markets and less risk of default which enables them to accumulate more debt. (Diamond, 1989). Using LEV, TANG was positive significant related for German focused firms (β2.44***, t=3.20), German conglomerates (β=0.22***, t=2.77) and Italian conglomerates (β0.24**, t=2.28). TANG was negative significant related to ALT_LEV for German conglomerates (β=-0.17***, t=-2.79) and Italian conglomerates (β-0.30***, t=-2.81). This suggested that for those groups of firm's tangibility is negatively related to leverage. This contradicted the theoretical perspectives stating that firm with more collateralized assets will have more favorable terms and therefore increase their leverage. Although, La Rocca et al. (2009) found similar negative results, Monteforte and Stagliano (2015) found mixed results regarding tangibility and the relation with leverage.

This study followed the approach of La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003) by examining the differences in the impact of degrees of product diversification and capital structure determinants for clusters of firms and their impact on leverage. It became clear that the impact was different among clusters of firms which was in line with previous studies. To test the second hypothesis, the independent variable, DOPD showed diverse significant results. Using LEV, DOPD showed a significant impact for German and Italian focused firms (β=90.02***, t=5.92 and β-13.59*, t=1.78). However, the impact in Germany was positive, and negative in Italy. Italian moderate diversified firms showed a positive significant impact on LEV (β=2.25*, t=1.78). Using ALT_LEV, the impact of DOPD was slightly different. German focused firms indicated a positive significant impact (β=9.21, t=4.32), Italy did not show similar results in comparison with LEV. Using ALT_LEV, Italian conglomerates showed a similar negative significant relation with DOPD and LEV (β=0.26**, t=-2.01).

In closing, examining all clusters of firms, most of the clusters showed a diverse insignificant relation, which was in line with the results of the study by Monteforte and Stagliano (2015). However, product diversified firms in Germany showed a significant positive trend for the impact of DOPD on LEV and ALT_LEV. When the DOPD increases across degrees of product diversification, the negative β tends to become less negative. Therefore, the results showed an increase, however most values were diverse. So, hypothesis 2 stating that there are differences across degrees of product diversification (focused, moderate diversified and conglomerate) and its impact on leverage was supported.

6.4 Robustness tests

To test the robustness of the results of this study, several robustness tests were performed in order to test for an endogeneity problem. The first robustness test was an OLS regression with the dependent variable equals LEV and ALT_LEV sorted by countries across three years presented in table 7. This sample was split up in a year analysis of 2015, 2016 and 2017 separately, presenting the results for LEV and ALT_LEV in table 10. After that, an OLS regression using one-year lagged variables on the righter side of the equation was conducted to test for simultaneity following La Rocca et al. (2009) and Monteforte and Stagliano (2015).

Table 10 Year analysis impact of corporate diversification on capital structure over the years 2015-2017 dependent variable LEV and ALT_LEV

Regression description	Full sample					
Regression year		2015		2016		2017
	LEV	ALT_LEV	LEV	ALT_LEV	LEV	ALT_LEV
DOPD	0.08 (0.18)	0.02 (0.37)	0.28 (0.65)	0.06 (1.09)	0.30 (0.81)	0.05 (1.14)
GROW	-0.74 (-1.25)	-0.10 (-1.51)	0.24 (0.47)	0.01 (0.19)	0.05 (0.07)	0.06 (0.70
NDTS	-0.28 (-0.06)	0.08 (0.17)	-1.82 (-0.52)	-0.15 (-0.37)	1.84 (0.52)	0.24 (0.55)
ROA	-3.09 (-1.50)	-0.50** (-2.27)	-2.78 (-1.41	-0.54** (-2.34)	-6.59*** (-3.35)	-1.15*** (-4.78)
LOG_SIZE	0.16** (2.03)	0.02** (2.56)	0.17** (2.28)	0.03*** (2.83)	0.14** (2.13)	0.02*** (2.77)
TANG	-0.79 (-1.33)	-0.10 (-1.53)	-0.74 (-1.37)	-0.08 (-1.33)	-1.13** (-2.33)	-0.13** (-2.21)
Adjusted R^2	0.037	0.095	0.016	0.066	0.083	0.165
Regression description	German sample					
DOPD	0.05 (1.14)	-0.02 (-0.31)	0.45 (0.67)	0.03 (0.33)	0.036 (0.62)	0.03 (0.40)
GROW	0.06 (0.70)	-0.08 (-0.71)	-0.11 (-0.10)	0.05 (0.42)	-0.37 (-0.31)	0.02 (0.13)
NDTS	0.24 (0.55)	0.08 (0.12)	-0.63 (-0.11)	-0.05 (-0.08)	0.81 (0.15)	0.19 (0.29)
ROA	-1.15*** (-4.78)	-0.60* (-1.86)	-3.80 (-1.14)	-0.76** (-2.06)	-7.19** (-2.50)	-1.23*** (-3.67)
LOG_SIZE	0.02*** (2.77	0.02 (1.21)	0.17 (1.18)	0.02 (1.41)	0.14 (1.19)	0.02* (1.67)
TANG	-0.13** (-2.21)	-0.03 (-0.24)	-0.64 (-0.70)	-0.03 (-0.32)	-1.05 (-1.31)	-0.12 (-1.28)
Adjusted R^2	0.165	0.034	-0.04	0.013	0.030	0.129
Regression description	Italian sample					
DOPD	-0.03 (-0.05)	0.05 (0.68)	0.09 (0.13)	0.08 (0.94)	0.15 (0.28)	0.06 (0.38)
GROW	-0.53 (-0.78)	-0.09 (-1.08)	0.39 (0.70)	0.01 (0.19)	0.36 (0.42)	0.09 (0.77)
NDTS	0.07 (0.01)	0.15 (0.22)	-1.91 (-0.44)	-0.20 (-0.37)	2.88 (0.60)	0.30 (0.49)
ROA	-3.38 (-1.25)	-0.41 (-1.26)	-1.85 (-0.74)	-0.37 (-1.19)	-5.69* (-1.97)	-1.00*** (-2.70)
LOG_SIZE	0.19* (1.82)	0.03** (2.14)	0.20* (1.86)	0.03** (2.36)	0.15* (1.70)	0.03** (2.13)
TANG	-1.14 (-1.59)	-0.16 (-1.85)	-0.90 (-1.28)	-0.12 (-1.43)	-1.27* (-1.97)	-0.15* (-1.86)
Adjusted R2	0.046	0.104	-0.014	0.052	0.055	0.133

*Notes: This table presents the OLS regression results. Table reports the unstandardized coefficients. Figures in parentheses represent the t-statistics. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

As can be observed in table 10, the outcomes were consistent with the results presented in table 7. Once again, in general, the results showed that the choice of debt level is a negative coefficient of ROA and TANG and a diverse coefficient for DOPD. Comparable to table 8, DOPD was insignificant for all samples in the year analysis which supports the rejection of hypothesis 1. Similar to table 8 and 9, LOG_SIZE showed a positive significant impact in all years. ROA was most of the time negative significant related to LEV. In line with table 8 and 9, TANG was most of the time negative and sometimes significant related to LEV and ALT_LEV. NDTS indicated almost no significant result, similar to table 8 and 9. Using year analysis to measure the impact of the degrees of product diversification on the capital structure over the years 2015-2017 separately, using LEV did not have much impact on the results of the OLS regression in table 8 and 9. The directions of the relationships in the yearly OLS regressions were the same as the OLS regression across three years. Therefore, can be concluded that endogeneity did not seem to play a role in this study and the causality went from the independent variable to the dependent variable and not vice versa. Moreover, using year analysis to measure the impact of corporate diversification on the capital structure over the years 2015-2017 separately using ALT_LEV in a similar way to table 8 and 9 did not have much impact on the results of the OLS regression in table 7. The directions of the relationships in the yearly OLS regressions showed the same diverse results as the OLS regression across three years in table 8 and 9. Therefore, can be concluded that endogeneity did not seem to play a role in this study and the causality went from the independent variable to the dependent variable and not vice versa.

La Rocca et al. (2009) and Monteforte and Staglianò (2015) pointed out that there are always characteristics influencing the capital structure which are hard to measure or to obtain and do not enter the model. In addition to make the endogeneity issue clearer. Leverage can be chosen by management concurrently with other firm's decisions, raising a problem of simultaneity than can suggest the use of a lagged dependent variables. A decision to issue debt can be made concurrently with the decision of new investment in corporate diversification (La Rocca et al., 2009).

As can be observed in table 11 showed the lagged variable for the independent variable $DOPD_{t-1}$ and control variables $GROW_{t-1}$, $NDTS_{t-1}$, ROA_{t-1}, LOG_SIZE_{t-1} and $TANG_{t-1}$, DOPD is still insignificant and most of the time diverse positive and negative related with LEV and ALT_LEV, similar to table 8 and 9 and similar to the year analysis in table 10. Even after controlling for simultaneity, hypothesis 1 was rejected given the insignificant diverse coefficients for DOPD. After examining the impact across degrees of product diversification on leverage by applying lagged variables for the independent variable and independent variables for clusters of firms showed that the impact of the degree of product diversification and capital structure determinants per cluster of firms was still different, but consistent with earlier finds in this study and with the previous work of La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003). Therefore, evaluating the results by the robustness tests, hypothesis 2 was still supported.The direction and strength show comparable results using the year analysis, lagged dependent variables for LEV and ALT_LEV and therefore can be concluded that endogeneity did not play a role in this study.

Table 11 Lagged variables for independent and control variables

Regression description	Full sample			
Regression year		2016		2017
	LEV	ALT_LEV	LEV	ALT_LEV
$DOPD_{t-1}$	0.01 (0.03)	0.02 (0.40)	0.25 (0.66)	0.05 (1.02)
$GROW_{t-1}$	-0.67 (-0.15)	-0.10 (-1.58)	-0.17 (-0.37)	-0.03 (-0.47)
$NDTS_{t-1}$	-2.50 (-0.63)	-0.18 (-0.39)	-2.73 (0.90)	-0.40 (-1.07)
ROA_{t-1}	-3.02 (-1.64)	-0.46* (-2.12)	-3.51** (-2.03)	-0.74*** (-3.45)
LOG_SIZE_{t-1}	0.14* (1.88)	0.02** (2.38)	0.12* (1.82)	0.02* (2.31)
$TANG_{t-1}$	-0.65 (-1.22)	-0.07 (-1.07)	-0.79* (-1.66)	-0.08 (-1.36)
Adjusted R^2	0.034	0.076	0.031	0.098
Regression description	German sample			
$DOPD_{t-1}$	-0.02 (-0.03)	-0.02 (-0.31)	0.22 (0.37)	0.01 (0.18)
$GROW_{t-1}$	-1.07 (-1.12)	-0.11 (-0.97)	-0.01 (-0.01)	0.05 (0.47)
$NDTS_{t-1}$	-1.81 (-0.30)	-0.05 (-0.07)	-2.77 (-0.53)	-0.41 (-0.67)
ROA_{t-1}	-2.59 (-0.92)	-0.44 (-1.41)	-4.74 (-1.64)	-1.00*** (-2.96)
LOG_SIZE_{t-1}	0.15 (1.08)	0.02 (1.11)	0.11 (0.93)	0.02 (1.37)
$TANG_{t-1}$	-0.53 (-0.58)	-0.02 (-0.14	-0.61 (-0.76)	-0.04 (-0.43)
Adjusted R^2	-0.023	0.005	-0.026	0.074
Regression description	Italian sample			
$DOPD_{t-1}$	0.13 (0.20)	0.07 (0.94)	0.15 (0.26)	0.06 (0.83)
$GROW_{t-1}$	0.43 (0.65)	-0.08 (-1.03)	-0.13 (-0.27)	-0.03 (-0.53)
$NDTS_{t-1}$	-0.244 (-0.43)	-0.27 (-0.39)	-2.46 (-0.63)	-0.40 (-0.79)
ROA_{t-1}	-3.55 (-1.37)	-0.49 (-1.54)	-2.46 (-1.09)	-0.54* (-1.84)
LOG_SIZE_{t-1}	0.13 (1.25)	0.02* (1.83)	0.16* (1.69)	0.02* (2.00)
$TANG_{t-1}$	-0.77 (-1.11)	-0.11 (-1.27)	-0.98 (-1.57)	-0.12 (-1.42)
Adjusted R^2	0.002	0.081	0.009	0.074

*Notes: This table presents the OLS regression results. Table reports the unstandardized coefficients. Figures in parentheses represent the t-statistics. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

The sample in this study consisted out of 133 publicly listed firms with 399 firm-year observations across 9 industries as showed in table 2. Although, most firms in the sample can be categorized in the manufacturing industry with almost 52%. Therefore, an OLS regression was conducted including only manufacturing firms to check wether precious results of the baseline model shown in table 6 still hold in this subsample. Model 1 used LEV as a dependent variable and model 2 ALT_LEV. The results of this regression were presented in table 11. As can be observed from the results, the findings corresponded with the previous results found in the baseline model in table 6. The coefficient of the degree of product diversification was one more time insignificant related in model 1 using LEV and similar in model 2 using ALT_LEV as a dependent variable. The degree of

product diversification did not observe any differences between an OLS regression with only manufacturing firms and the overall sample. The variables return on assets, firm size and tangibility showed similar results with the baseline model in table 6. Return on assets showed a similar negative significant relation with LEV and ALT_LEV and firm size presented a positive significant relation.

Table 11 OLS regression with manufacturing firms subsample

Regression description	Full sample	German sample	Italian sample
Regression	1	2	3
Model 1	LEV	LEV	LEV
DOPD	-0.21 (0.58)	0.34 (0.89)	0.09 (0.26)
GROW	0.35 (0.50)	-0.51 (-0.85)	0.02 (0.06)
NDTS	3.53 (0.88)	-0.24 (-0.71)	-0.44 (-0.16)
ROA	-6.17 (-3.87)***	-4.43 (-2.56)**	-3.43 (-2.32)**
LOG_SIZE	0.01 (0.18)	0.14 (1.75)*	0.18 (3.20)***
TANG	-0.41	-0.61 (-1.19)	-1.04 (-2.70)***
Adjusted R2	0.073	0.031	0.076
N	399	210	189
Regression number	4	5	6
Model 2	ALT_LEV	ALT_LEV	ALT_LEV
DOPD	-0.001 (-0.30)	0.01 (0.23)	0.06 (1.51)
GROW	0.11 (1.41)	-0.02 (-0.23)	-0.01 (-0.29)
NDTS	0.64 (1.47)	-0.004 (-0.01)	-0.03 (-0.08)
ROA	-1.07 (-6.15)***	-0.81 (-4.37)***	-0.54 (-2.96)***
LOG_SIZE	0.01 (1.16)	0.02 (2.38)**	0.03 (4.00)***
TANG	-0.08 (-1.22)	-0.05 (-0.88)	-0.14 (-2.89)***
Adjusted R^2	0.149	0.098	0.135
N	399	210	189

*Notes: This table presents the OLS regression results. Table reports the unstandardized coefficients. Figures in parentheses represent the t-statistics. * Significant at 0.10 or better. ** Significant at 0.05 or better. *** Significant at 0.01 or better.*

7 Conclusion

This chapter provides the conclusion of this study. To begin with, the main findings based on the statistically analyses were summarized, conclusions will be made and the research question will be answered. After that, the limitations of this research are described and discussed. Lastly, recommendations for further research are described.

7.1 Main findings

This study examined the impact of corporate diversification on the capital structure in a German and Italian context. Moreover, Firms were sorted by a cluster analysis by degrees of product diversification, distinguishing focused firms, moderate diversified firms and conglomerates to test for differences in the impact across degrees of product diversification and capital structure determinants. To test the hypotheses, an OLS regressions with the degree of product diversification and year controls were conducted. This study included several robustness tests to check for endogeneity issues. This study was based on a combined full sample of 429 observations from 2015 to 2017, divided in a German sample of 70 with 210 firm-year observations, including only publicly listed German firms, and an Italian sample with 73 firms with 219 firm-year observations for 73 firms, including only Italian publicly listed firms.

In line with previous studies of La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003), diverse significant and insignificant relationships were found for the impact of corporate diversification on the capital structure. The capital structure was measured by leverage as the debt-to-equity ratio (Kremp et al., 1999; De Miguel and Pindado, 2001; Ozkan 2001; and Kochhar and Hitt, 1998) and by the total debt divided by total assets (Monteforte and Staglianò, 2015; La Rocca et al., 2009; Singh et al., 2003) for robustness. Both variables as a dependent variable to measure leverage, showed diverse results. Therefore, the first hypothesis stated that corporate diversification has a positive impact on leverage. Corporate diversification, measured by the degree of product diversification showed a negative insignificant relation on the capital structure, meaning that diversified firms actually had lower leverage. In comparison with the OLS regressions in table 6, which did not distinguish the degrees of diversification, no significant results were found regarding DOPD and therefore hypothesis 1 was rejected. This result can be explained by the pecking-order theory. The debt markets seemed to raise doubts about the conducted corporate diversification strategies, and such firms had to finance their investment choices through internal finance. This result was consisted in the German and Italian sample.

The second hypothesis stated that there are differences across degrees of product diversification (focused, moderate diversified and conglomerate) and its impact on leverage following previous work of La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al., (2003). The expectation was that the financial strength of a combined firm shields itself better from default than any of the firms could have done alone. Hence, based on the co-insurance effect, firms will experience financial synergies trough combining businesses. Combining businesses with imperfect cash flows enables firms to lower their volatility of cash flow and cash earnings (Lewellen, 1971). Therefore, the chance of financial distress of firms is decreased. However, OLS

regressions in table 8 and 9, distinguishing degrees of product diversification across countries showed negative significant results for Italian conglomerates and positive insignificant results for German conglomerates. Clusters of firms, divided by their degree of product diversification did show diverse results which supported hypothesis 2.

Concluding the results of this study, the main research question can be answered. The main research question measured the impact of corporate diversification on the capital structure of publicly listed German and Italian firms. No empirical evidence was found that corporate diversification had a consistent positive significant impact on the capital structure, measured by leverage for both German as Italian firms, meaning that corporate diversification did not explain differences in the capital structure. These results were in line with La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003).

The degree of product diversification did show differences in the impact on the capital structure and capital structure determinants across clusters of firms. For example, using LEV as a dependent variable, German focused firms showed significant results for the degree of product diversification, firm growth, return on assets, firm size and tangibility and no significant results for German moderate diversified firms. In addition, a mean comparison focusing on leverage showed that there was a significant difference (5%) between German and Italian moderate diversified firms. Overall can be concluded that corporate diversification did not have an consistent impact on the capital structure, but the impact between degrees of product diversification differs from each other which is in line with previous studies. The impact of capital structure determinants among clusters of firms sorted by the degree of product diversification indicated consistent significant results for tangibility, return on assets and grow, however their impact differs between a positive and negative impact. Overall, the capital structure determinants illustrated that leverage is a negative function of ROA and TANG, and a positive function for SIZE, meaning that larger, less profitable firms with less collateral had less debt in their capital structure. These findings were in line with previous findings by La Rocca et al. (2009), Monteforte and Staglianò (2015) and Singh et al. (2003).

A mean comparison between Germany and Italy did not show significant differences in the impact of corporate diversification on the capital structure. Only one difference was found between moderate diversified firms. It was expected to see more non-debt tax shields due to the high corporate tax rates in Italy. The results showed a positive significant relation for non-debt tax shields with leverage for Italian moderate diversified firms and a negative significant relation for Italian conglomerates which contradicts the expectation based on the theory described by La Rocca et al. (2009). In closing, it can be said that the results of German and Italian firms in general, showed many similarities. The lower GDP growth of the country and the higher corporate tax rate of Italy did not seem to make a considerable difference in comparison with Germany. There were no significant differences found using year and industry controls.

7.2 Limitations and recommendations

This section describes and discusses the limitations of this study and the recommendations for further research. The first limitation is about the sample size. The total number of firms in the full sample of this study was 143 with 429 firm-year observations, divided in a German sample with 70 firms with 210 firm-year observations and an Italian sample with 73 firms with 219 firm-year observations. This is partly due to the fact that not all firms publish information on their revenue from segments and missing financial information. Other studies by La Rocca et al. (2009) had a sample of 180 firms, Monteforte and Staglianò (2015 used a sample of 126 firms and Sigh et al. (2003) used a sample of 1.127 firms. The sample in this study was comparable with the number of firms in the study of La Rocca et al. (2009) and Monteforte and Staglianò (2015), however their firms where only Italian and the sample in this study was split-up resulting in 73 Italian firms.

A second limitation of the sample is the distribution of firms based on the four digit primary Standard Industrial Classification codes. Noticeable is that most firms were operating in Manufacturing. Manufacturing firms typically report higher leverage than firms in other segments because of their higher amount of investments in machinery and other assets. This might skew the results.

The third limitation is about the generalizability of the results. This study tried to make the results more generalizable by including German and Italian firms to evaluate differences in country growth and corporate tax rates. However, there are many more countries with different growth rates, corporate tax rates and laws. Besides that, this study focused on publicly listed firms due to the availability of data for this study. It could be that the impact of corporate diversification is different for private firms.

The fourth limitation is about the measurement types of corporate diversification. This study did not distinguish corporate diversification into related and unrelated corporate diversification but combined the two directions in one total corporate diversification value using the specialization ratio. The secondary data concerning the degree of product diversification was collected from financial statements of German and Italian firms. In case there were misstatements or errors arising from the financial statements then this study is limited to those errors.

A fifth limitation is the lack of a variable for year and industry control in the subsamples sorted by the degree of product diversification. Previous studies by La Rocca et al. (2009) and Monteforte and Stagliano (2015) did include this control variable. However, due to the limited sample in this study and the many control variables already included. An overfit model can cause the regression coefficient, p-values and R2 to be misleading (Field, 2009) by including even more control variables like year and industry in table 8 and 9.

La Rocca et al. (2009) and Monteforte and Stagliano (2015) described an opposite impact for related and unrelated diversification on debt and capital structure determinants. Therefore, a suggestion for further research is to distinguish corporate diversification into related and unrelated diversification in an after-crisis sample to evaluate earlier results, including the specialization ratio of Rumelt (1974) to examine the results between clusters of firms by their degree of product diversification in the present time.

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Appendix A List of firms

Germany		Italy	
1.	DAIMLER AG	76.	ENEL SPA
2.	SIEMENS AG	77.	ENI S.P.A.
3.	DEUTSCHE TELEKOM AG	78.	TELECOM ITALIA S.P.A.
4.	UNIPER SE	79.	LEONARDO S.P.A.
5.	BASF SE	80.	LUXOTTICA GROUP SPA
6.	DEUTSCHE POST AG	81.	SAIPEM SPA
7.	AUDI AG	82.	PRYSMIAN S.P.A.
8.	BAYER AG	83.	SARAS S.P.A. - RAFFINERIE SARDE
9.	RWE AG	84.	ATLANTIA S.P.A.
10.	CONTINENTAL AG	85.	HERA SPA
11.	THYSSENKRUPP AG	86.	SALINI IMPREGILO S.P.A.
12.	E.ON SE	87.	PIRELLI & C. S.P.A.
13	INNOGY SE	88.	A2A S.P.A.
14.	METRO AG	89.	AUTOGRILL S.P.A.
15.	DEUTSCHE LUFTHANSA AG	90.	FINCANTIERI S.P.A
16.	FRESENIUS SE & CO. KGAA	91.	IREN S.P.A.
17.	ENBW ENERGIE BADEN-WURTTEMBERG AG	92.	MEDIASET S.P.A.
18.	SAP SE	93.	MAIRE TECNIMONT S.P.A.
19	HOCHTIEF AG	94.	ESPRINET S.P.A.
20.	ADIDAS AG	95.	ASTALDI S.P.A.
21.	HENKEL AG & CO. KGAA	96.	BUZZI UNICEM S.P.A.
22.	TUI AG	97.	CIR S.P.A. - COMPAGNIE INDUSTRIALI RIUNITE
23.	FRESENIUS MEDICAL CARE AG & CO. KGAA	98.	COFIDE - GRUPPO DE BENEDETTI S.P.A.
24.	HEIDELBERGCEMENT AG	99.	ACEA SPA
25.	LINDE AG	100.	SNAM S.P.A.
26.	BAYWA AG	101.	BREMBO SPA
27.	MAN SE	102.	DANIELI & C. OFFICINE MECCANICHE SPA
28.	EVONIK INDUSTRIES AG	103.	TERNA S.P.A. - RETE ELETTRICA NAZIONALE
29.	SCHAEFFLER AG	104.	YOOX NET-A-PORTER GROUP S.P.A.
30.	BRENNTAG AG	105.	DE LONGHI SPA
31.	AURUBIS AG	106.	DAVIDE CAMPARI - MILANO S.P.A.
32.	HAPAG-LLOYD AG	107.	ASTM S.P.A.
33.	LANXESS AG	108.	SOGEFI S.P.A.
34.	SALZGITTER AG	109.	OVS S.P.A.
35.	KION GROUP AG	110.	MARR SPA
36.	TELEFONICA DEUTSCHLAND HOLDING AG	111.	IMMSI SPA
37.	SUDZUCKER AG	112.	CALTAGIRONE SPA
38.	BEIERSDORF AG	113.	I.M.A. INDUSTRIA MACCHINE AUTOMATICHE S.P.A.
39.	INFINEON TECHNOLOGIES AG	114.	PIAGGIO & C. S.P.A.
40.	KLOCKNER & CO SE	115.	SOCIETA INIZIATIVE AUTOSTRADALI E SERVIZI SPA - SIAS

41. RHEINMETALL AG
42. MTU AERO ENGINES AG
43. WACKER CHEMIE AG
44. LEONI AG
45. OSRAM LICHT AG
46. GEA GROUP AG
47. UNITED INTERNET AG
48. ZALANDO SE
49. PROSIEBENSAT.1 MEDIA SE
50. PAUL HARTMANN AG
51. MANZ AG
52 BILFINGER SE
53. MVV ENERGIE AG
54. AURELIUS EQUITY OPPORTUNITIES SE & CO. KGAA
55. K+S AKTIENGESELLSCHAFT
56. DURR AG
57. KRONES AG
58. VONOVIA SE
59. AXEL SPRINGER SE
60. BECHTLE AG
61. FREENET AG
62. KUKA AG
63. JUNGHEINRICH AG
64. 1&1 DRILLISCH AG
65. NORDEX SE
66. SYMRISE AG
67. FRAPORT AG FRANKFURT AIRPORT SERVICES WORLDWIDE
68. HUGO BOSS AG
69. SIXT SE
70. DRAGERWERK AG & CO. KGAA
71. HEIDELBERGER DRUCKMASCHINEN AG
72. FUCHS PETROLUB SE
73. DMG MORI AG
74. STADA ARZNEIMITTEL AG
75. KSB SE & CO. KGAA
116. SALVATORE FERRAGAMO S.P.A.
117. ANSALDO STS S.P.A.
118. ARNOLDO MONDADORI EDITORE SPA
119. AMPLIFON S.P.A.
120 MONCLER S.P.A.
121. CEMENTIR HOLDING S.P.A.
122. SESA S.P.A.
123. CAIRO COMMUNICATION SPA
124. INTERPUMP GROUP SPA
125. FALCK RENEWABLES S.P.A.
126. SAFILO GROUP S.P.A.
127. ERG S.P.A.
128. TOD'S S.P.A.
129. RIZZOLI CORRIERE DELLA SERA MEDIAGROUP S.P.A.
130. REPLY S.P.A.
131. SNAITECH S.P.A.
132. GEOX S.P.A.
133. SOL SPA
134. BIESSE SPA
135. LA DORIA S.P.A.
136. GEDI GRUPPO EDITORIALE S.P.A.
137. CARRARO SPA
138. DATALOGIC SPA
139. ASCOPIAVE S.P.A.
140. ITALMOBILIARE S.P.A.
141. BRUNELLO CUCINELLI S.P.A.
142. ELICA S.P.A.
143. PRIMA INDUSTRIE SPA
144. EMAK S.P.A.
145. CERVED INFORMATION SOLUTIONS S.P.A.
146. BENI STABILI S.P.A. SIIQ
147. IRCE S.P.A.
148. ITALIAONLINE S.P.A.
149. NICE S.P.A.
150. AEFFE S.P.A.