MASTER THESIS

Capital structure and firm performance across the corporate life cycle of German listed firms

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Abstract

The capital structure of a firm will influence its performance. Companies that are in the growing stage might not have adequate capital to fund their activities. For this reason, they might resolve to debt to be able to finance their day-to-day activities. However, other corporations might prefer to calculate debt so that they can pay less on taxes. For some organizations, equity is preferred over debt. These differences between companies make them rather unique and introduce all the noticeable differences among firms. This paper investigates the capital structure and firm performance during the corporate life cycle of German-listed firms. Different firms in diverse Growth stages are compared to determine how they interact with the market. Factors that also manipulate performance are taken into consideration and discussed. Various research work from multiple individuals is considered, and their findings are incorporated in this study to help shed clarify on the capital performance of German-listed firms. The major finding of this study is that the capital structure has a definite influence on a company's performance, which confirms the assumption of the agency costs theory. Furthermore, corporate life cycle stages do impact the relationship between capital structure and firm performance.

Keywords: Capital Structure, Firm Performance, Corporate Life Cycle, German Listed Firms

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1. Introduction

Since the 1950s, there is an ongoing debate on capital structure in corporate finance. The starting point of this debate was the Modigliani and Miller theorem (1958) which concluded that when there exists a perfect capital market, debt and equity can be substituted with each other since the value of a firm is determined only by its assets. This theory suggested that capital structure decisions would not influence the value of a firm. This scenario is only possible in a perfect capital market, suggesting that capital structure influences firm value when there is no perfect capital market.

The challenge for firms is to determine their financing options and structure to achieve goals and maintain going concern. The relative importance of corporate financing sources and the capital structure depends on the company life cycle. The capital structure shows how companies are financed. Through the years, several theories have emerged. Three famous theories are the Trade-off theory, the pecking order theory, and the agency cost theory. According to the trade-off theory, firms issue debt to reach tax-saving effects compared to interest expenses on profit (Kraus & Litzenberger, 1973). The pecking order theory suggests that firms prefer to fund internal rather than external because of adverse selection costs, which means a firm (when possible) prefers equity over debt (Myers, Stewart, Majluf, & Nicholas, 1984). Agency cost theory was developed by Jensen and Mecklin (1976). This theory explains and deals with conflicting interests between debt holders, managers, and shareholders. According to the Pecking Order theory, the best capital structure is the ratio between debt and equity with the highest firm value and the lowest agency costs.

According to Miller and Friesen (1984), corporate life cycle theory suggests that firms move through different stages with different structure, decision-making style, and organization strategy. Corporate life cycle and capital structure studies have mixed findings. For example, Frielinghaus, Mostert, and Firer (2005) found no linear relationship between the corporate life cycle and capital structure, and capital structure varies for every corporate life cycle stage. They found that consistent with the pecking order theory suggests that early corporate life cycle stages do not generate enough cash flows to finance internally and require financing externally through debt. However, Frielinghaus et al. (2005) found that in line with the pecking order theory that when a firm enters the Mature stage, they generate more retained earnings which makes it possible to finance internally, which lowers debt levels. In the final corporate life cycle stage, the Decline stage, firms retained earnings Decline, and firms focus more on cost reduction. They are not able to finance internally and move to reissue debt. Meanwhile, the link between company performance and the capital structure has different patterns depending on each stage of the company life cycle. Myers and Majluf (1984) stated that firms with significant information asymmetry problems, such as Growth firms, are better to follow pecking order theory in making financing choices by prioritizing internal funding sources. In line with the trade-off theory, for a company with Growth opportunities, the use of debt is limited as in the case of bankruptcy, the value of Growth opportunities will be close to zero (Myers, 1984; Harris & Raviv, 1991). Firms with fewer Growth prospects should use debt because it has a disciplinary role (Jensen, 1986), and the free cash flow may be reduced by having more debt. Previous studies did not explain the differences in the effect of the company life cycle on the relationship between capital structure and firm performance. This study aims whether capital structure choices during different life cycle stages affect firm performance. Since firm performance is influenced by the capital structure and capital structure decisions are dependent on the corporate life cycle, this study tries to fill the gap of whether the capital structure influences firm performance during different corporate life cycle stages. The study's goal is to answer the following research question: *'Do corporate life cycle stages effect the influence of capital structure on firm. Performance on German listed firms in the period of 2011-2018?'* This means that the objectives of this study are firstly, to analyze the influences of life cycle and sets of control variables on capital structure; and secondly to capture the effect of corporate life cycle on the relationship between capital structure and company performance.

2. Literature Review

In this chapter, the theories of the corporate life cycle, capital structure, and firm performance are explained. This chapter also explains empirical evidence from already investigated research concerning this subject. Also, in this chapter, the mutual relationships and the hypotheses formed based on these theories, research, and relationships are included.

2.1 Corporate Life Cycle

According to Miller and Friesen (1984) a firm goes through different stages, the so-called corporate life cycle stages (Miller & Friesen, 1984). Theorists use different stages and name them differently; however, in general, a firm goes through three stages: the Growth, Mature, and Decline stage. These stages are explained further in the next section. Life cycle theory suggests that appropriate Growth and capital capacity strategies depend on the firm's life cycle stage (Anthony & Ramesh, 1992). Miller and Friesen (1984) mention a difference in structure, decision-making style, and organization strategy. Adizes (1979) states that there are specific behavior patterns in every stage of the firm's life cycle. These patterns are predictable and are part of the different lifecycle stages. In the following sections of the firm life cycle, I discuss how researchers classify firms in their life cycle stages and their determinants. I also describe the determinants and impact of the firm life cycle stages.

2.1.1 Corporate Life Cycle Stages

As shown in Table 1, there is no clear consensus on how many stages a firm goes through in its life cycle. There are theorists which state a firm goes as much as ten stages (Adizes, 1979), and there are theorists that state that a firm only goes as little as through three stages like, Anthony and Ramesh (1992), Frielinghaus et al. (2005) and La Rocca et al. (2011). The three stages most used in the literature are Growth Mature and Decline (or similar). For example, La Rocca et al. (2011) used Young, Middle-aged and Old stages in their research. Ahsan et al. (2016) classified the firm's life stages into Growth, Mature, and Decline. Castro et al. (2016) also used three stages, namely Introduction, Growth, and Maturity (which is comparable to Ahsan et al. (2016). Frielinghaus et al. (2005), when using the ten-stage (Courtship, Infancy, Go-Go, Adolescence, Prime, Stable, Aristocracy, Recrimination, Bureaucracy and Death) model of Adizes (1979), changed this model into three stages which are early, prima and late.

Firm life cycle stages	Three stages		Four stages		Five stages		Ten stages	
Researchers	Anthony and Ramesh (1992)	1. Growth 2. Mature 3. Stagnant	Mintzberg (1984)	1. Formation 2. Development 3. Maturity 4. Decline	Miller and Friesen (1984)	1. Birth 2. Growth 3. Maturity 4. Revival 5. Decline	Adizes (1979)	1. Courtship 2. Infancy 3. Go-go 4. Adolescence 5. Prime 6. Stable 7. Aristocracy 8. Recrimination 9. Bureaucracy 10. Death
	Frielinghaus et al. (2005)	1. Early 2. Prime 3. Late						
	La Rocca et al. (2011)	1. Young 2. Middle-aged 3. Old	Faff et al. (2016)	4. Introduction 5. Growth 6. Mature 7. Decline/ shake-out	Dickinson (2011)	8. Introduction 9. Growth 10. Maturity 11. Shake-out 12. Decline		
	Castro et al. (2016)	1. Introduction 2. Growth 3. Maturity						
	Ahsan et al. (2016)	1. Growth 2. Mature 3. Decline						

Table 1 Corporate life cycle stages used in capital structure literature

Although the models have their differences in the number of stages and the stages' names, they also appear to have similarities. For example, the researchers seem to agree that firms move through a Growth, Mature, and Decline/shake-out stage. However, differences can be found in different models in classifying firms in their respective corporate life cycle stages. There are studies where only one variable (univariate) is used to classify the firm, for example, age is used by La Rocca et all. (2011) in their study. While other studies used multiple variables (multivariable) to classify firms (for example, annual dividend, capital expenditures, age, and percentage of sales Growth (Anthony & Ramesh, 1992)). Adding to this, Dickinson (2011) uses cash flow patterns to identify firm life cycle stages. Finally, La Rocca et al. (2011) have done a two-step cluster analysis to divide firms into their respective life cycle. Overall, the studies agree on at least three stages being: Growth, Mature, and Decline. The firm life cycle can also be related to financing and investment decisions, and this can be observed from the amount of retained earnings in the firm's capital structure (Owen & Yawson, 2010). Growth stage firms are known for their considerable sales Growth, high investments to deny competitors into the market, and product diversification (La Rocca, La Rocca, & Cariola, 2011). According to Miller and Friesen (1984), managers gain more decision-making responsibilities, and a separation of ownership starts to grow. To keep growing and make their products more known to potential customers, growing firms tend to have high R&D and investments compared to other firm stages (Dickinson, 2011). In this stage, firms finance their investments through external financing (Grabowski & Mueller, 1975). Next to raising external funds, firms in this stage invest all their profits back into the organization. This is confirmed by Frielinghaus et al. (2005), who adds that firms need this external financing to keep their sales output growing. Over time, as firms continue to innovate and become Mature, they accumulate profits and have higher retained earnings in their capital mix (Owen & Yawson, 2010). Companies face a more stable sales Growth compared to Growing firms. Since Mature firms face more competition, Miller and Friesen (1984) argue that these firms take on less risk in investments and spending capital. Wernefelt (1985) adds that Mature firms only invest to stay in the market instead of growing further. Furthermore, Mature firms prefer to finance internally, which generates enough cash flow for. Also, profitability and size appear to be maximized during this stage (Dickinson, 2011). Instead of focussing on Growth, Mature firms shift their mindset to efficiency and reducing costs. When a firm faces reduced Growth, declining sales, and low profitability, they enter the final stage, which is the Decline stage (Dickinson, 2011). There is no more innovation (Miller & Friesen, 1984). According to Wernefelt (1985), Growth rates Decline, and prices also fall. Following this, these firms lose market share swiftly. According to Miller and Friesen (1984), firms cannot invest, and they try to save on resources. Even though they try to save resources, they cannot produce enough resources to survive (Adizes, 1979). To overcome this of having too little internal resources and go bankrupt, Declining firms make more use of external financing (Frielinghaus, Mostert, & Firer, 2005).

2.1.2 Impact of the Corporate Life Cycle

Studies show that Growth and Decline firms are less profitable and riskier, while Mature firms are more profitable and less risky (Dickinson, 2011; Habib & Hasan, 2019). Thus, it is not unreasonable to expect that these differences will impact financial distress levels across each stage of the firm life cycle (Al-Hadi, Chatterjee, Yaftian, Taylor, & Hasan, 2019). Firms in the earlier life cycle stages face more financial problems than established firms, and management searches for ways to improve capabilities and resource retention (Helfat & Peteraf, 2003). However, according to Helfat en Peteraf (2003), human capital, social capital and cognition, and resources are lacking in the Growth stage of the corporate life cycle. There is high uncertainty about future cash flows, making it difficult to raise additional capital and face financial distress (Helfat & Peteraf, 2003). However, firms in the Mature stage may generate enough retained earnings to make them less vulnerable to face financial distress (Habib & Hasan, 2019). Compared to Growth firms, firms in the Maturity stage have higher earnings per share, retained earnings/total assets, and return of net operating assets, which leads to higher dividend pay-out (Dickinson, 2011; DeAngelo, DeAngelo, & Stulz, 2010). Adding to this, Al-Hadi et al. (2019) state that firm size and age, profit margins, and earnings increase in this stage, making these firms less vulnerable to financial distress. Berger and Udell (1998) stated that a firm's need for capital and the availability of financial resources depends on corporate life cycle stages. They, for example, found that Growth stage firms are more reliant on debt financing. However, they are less reliant on debt in the Mature and Decline stage. Adding to this, they found that smaller firms use more equity from principal owners, whereas larger firms issue more debt from bank loans and trade credit. Owen and Yawson (2010) added that the corporate life cycle might influence investment, financing decisions, and operating performance. They state that through life cycle stages, the structure of finance changes for a company. For example, in the Growth stage, a company invests all its retained earnings and tries to raise external funds to keep growing. When a company increases its profits and earnings, they reach the Mature stage. According to Dickinson (2011), measures like size, profitability, and age are highest in the Maturity stage and lower in the Growth and Decline stages. As stated before, investment opportunities decrease overtime when a firm goes through the corporate life cycle. Koh et al. (2015) found that firms that face financial distress choose different restructuring strategies during different stages in the firm life cycle. They found that relatively young firms tend to reduce employees to save money when facing financial distress. However, companies in which are more Mature tend to lean towards asset restructuring. Lastly, DeAngelo et al. (2010) found that the decisions to pay dividends are significantly different during different life cycle stages. Their research found that when a company has a high amount of retained earnings (Mature firms), they are more likely to pay dividends than when retained earnings are low. Concluding from this, the firm life cycle has much impact on firms' finance and accounting choices. Firms make different decisions when it comes to financing, investing, and operations.

2.2 Capital Structure

In financial management, capital structure theory refers to a systematic approach to financing business activities through a combination of equities and liabilities. A firm can decide on its own how to be financed. When a firm is financed by liabilities (debt), the company's resources (cash flows) go to bondholders. When a firm is financed by equity, a company's cash flows will go to the shareholders, which is riskier (Brealey, Myers, & Allen, 2017). According to Brealey et al. (2017), firms search for the perfect debt-equity mix so they can maximize firm value. The maximum firm value through capital structure ratio is achieved when the lowest overall cost of capital (WACC) is reached. The WACC is the calculation of the cost of capital of a firm. In the WACC calculation, all sources of capital, stocks, bonds, and debts are included. To calculate the present value of a company, the WACC is used in the form of a discount rate for cash flows. This means a decrease in WACC increases the value and decreases the risk of a firm. This target ratio is often named the company's target capital structure (Ross, Westerfield, & Jordan, 2014). A company can simply adjust the capital structure mix. For instance, when a firm wants to have a higher debt to equity ratio, it can issue bonds and, with these resources, buy back stock. Alternatively, when a firm wants a lower debt-equity ratio, it can increase stocks and, with this income, pay off debt. Ross et al. (2014) Call these activities capital restructuring. Over the years, several capital structure theories have been developed, with one of the first and most famous being the Modigliani and Miller (1958) irrelevance theory. According to Modigliani and Miller (1958), the debt-equity ratio does not affect firm value during certain occasions. This theory is developed over five centuries ago, though and in the decades after other theorists questioned and tested Modigliani and Millers' (1958) theory. These new studies found in contrast to the irrelevance theory that debt equity ratio affects firm value because of information asymmetry, taxes and agency costs. After these revelations the Modigliani and Miller (1958) theorem elaborated to different theories which by other theorists proved or disproved these theories. Myers (2001) states that there exists no one theory which state the perfect capital structure. According to him it depends on the circumstances whether or not findings are in line with a certain theory. Mostly however, findings are consistent with several competing debt equity ratios. Huang and Ritter (2009) add that there is not one single theory that explains the perfect capital structure choices. Modigliani and Miller (1963) added taxes in their irrelevance theory model which highlighted the benefits conferred by debt finance in reducing a firm’s taxation liability. Adding to this, DeAngelo and Masulis (1980) came with the trade-off theory, where they stated that the advantage of issuing debt because of decreased taxes was offset by an increasing risk. Here they suggested an optimum level of debt where the present value of tax savings due to further borrowing is just offset by increases in the present value of costs of distress (Mac and Bhaird & Lucey, 2010). Another famous and opposite theory derived from the Modigliani and Miller (1958) theory is the Pecking order theory developed by Myers (1984) and Myers and Majluf (1984). This theory is based on information asymmetries where they state that 'inside management is better informed of the firm value than 'outside' investors. These information asymmetries are varying costs of additional external finance, as potential investors perceive equity to be riskier than debt.

Concluding from this, they state that firms try to overcome this 'undervaluation' by preferring internal finance investment projects over external financing. In the following two sections, the pecking order theory, the trade-off theory, and the agency costs theory are explained more.

2.2.1 Pecking Order Theory

Modigliani and Miller (1958) assumed that differences in information do not exist. Myers (1984) and Myers Majluf (1984) questioned these assumptions and stated that differences in information between insiders and outsiders do matter and influence capital structure choices. The Pecking order theory states that there is no optimal debt-equity ratio. Different financing sources are ranked through their level of information asymmetry and adverse selection costs. Frank and Goyal (2003) explain the Pecking Order theory by supposing three funding sources available for a firm being retained earnings, debt, and equity. They state that Retained earnings have no adverse selection problem. Equity is subject to serious adverse selection problems, while debt has only a minor adverse selection problem. For an investor, equity is riskier than debt. However, the risk premium is also prominent on equity. This means that an outside investor demands more return on equity than on debt (Rajan & Zingales, 1995). However, according to the Pecking Order theory, retained earnings are better funding than debt, and debt is better than equity. The Pecking Order theory here says that because of this, a firm will fund internally as much as possible. When there are not enough retained earnings, a firm moves to debt financing. Finally, when there is no other option, a firm will move to equity. Harris and Raviv (1991) state that when a firm wants to finance projects by issuing equity, under-pricing might occur, and the new investors capture more than the net present value (NPV) of the new project, which results in a loss of current shareholders. This is an example of information asymmetry. This will result in a rejected project even though the NPV is positive. To avoid this 'underinvestment,' a firm can finance the project in another way that is not undervalued by the market. A firm can finance internally with retained earnings and with riskless debt, resulting in no undervaluation. For this reason, retained earnings and (not too) risky debt are preferred over equity financing.

In the literature, several studies test and confirm/deny the pecking order theory. For example, Shyam-Sunder and Myers (1991), in their regression of a firm's net debt issued on the financing deficit in the 1971-1989 period, found that the pecking order theory is an excellent first-order descriptor of financing behavior. Agca and Mozumdar (2007) found evidence for the pecking order theory when controlling for firms' debt capacities. Furthermore, de Jong, Verbeek and Verwijmeren (2011) when testing whether the trade-off theory or the pecking order theory in their US sample applies, found that in about three quarters of the time firms follow the pecking order. However, there are also studies which deny the pecking order theory. For example, Frank and Goyal (2003) when using the same regression as Shyam-Sunder and Myers (1991), but with a more comprehensive dataset, found that the pecking order theory is a poor performance of financing behavior. Adding to this, Leary and Roberts (2010) researched the empirical relevance of the pecking order theory. They found that when a firm is financing investment expenditures, facing asymmetric information, and is not constrained by debt capacity or financial distress concerns, that even when controlling for debt capacity the pecking order theory is not able to characterize even half of the firms' decisions accurately.

2.2.2 Trade-Off Theory

When questioning the Modigliani and Miller (1958) irrelevance theory, Kraus and Litzenberger (1973) came up with the trade-off theory. This theory states that there are taxes, and because of this, an optimal capital structure ratio can be achieved to maximize firm value. According to Kraus and Litzenberger (1973), the optimal capital structure ratio balances saving tax and increasing agency and financial distress costs when debt levels are high. Tax savings are achieved because tax is deductible on paid interest on outstanding debt. For this reason, issuing debt lowers costs Myers (1977). Adding to this, this means that that return to bondholders is tax-free (2017). However, the consequence is that when a firm chooses to finance through debt, the probability of financial distress grows, which can lead to bankruptcy. Distress occurs when obligations to creditors are not achieved. Bankruptcy means that debt equals the value of assets which means that the value of equity becomes zero, and the ownership of the assets is transferred to bondholders (Ross, Westerfield, & Jordan, 2014). Financial distress is costly and is dependent on the likelihood of distress and costs faced when bankruptcy happens. A company can live on the brink of bankruptcy for many years. It is possible as long as the company can pay the interest payment on a debt. When a company has average debt financing, the likelihood and costs of financial distress are insignificant compared to the tax advantages. When a firm increases its debt rate, the costs of financial distress will increase and equal tax advantages. Concluding from this, an optimum can be reached when increases in the present value of distress costs just offset the present value of tax savings due to further borrowing (Brealey, Myers, & Allen, 2017). Flannery and Rangan (2006) add to this by stating that the trade-off theory maintains that market imperfections generate a link between leverage and firm value, and firms take positive steps to offset deviations from their optimal debt ratios. The speed with which firms reverse deviations from their target debt ratios depends on the cost of adjusting leverage. With zero adjustment costs, the trade-off theory implies that firms should never deviate from their optimal leverage. This concept of reaching an optimal leverage ratio is the so-called static trade-off theory (2011). However, this only happens in a perfect environment. When companies change over time because of endogenous and exogenous factors, the perfect capital structure ratio changes. This results in an adjustment of the firm's capital structure.

The change based on these actions is called the dynamic trade-off theory (Fischer, Heinkel, & Zechner, 1989). This so-called optimal capital structure can be different for each company. According to the trade-off theory, a less profitable company and has risky intangible assets is very likely to finance on equity, while profitable firms with tangible assets, according to the trade-off theory, should have high debt levels. Concluding from this and based on the Pecking Order theory, highly profitable firms have more taxable income and high debt-servicing capacity, which results in a high debt ratio.

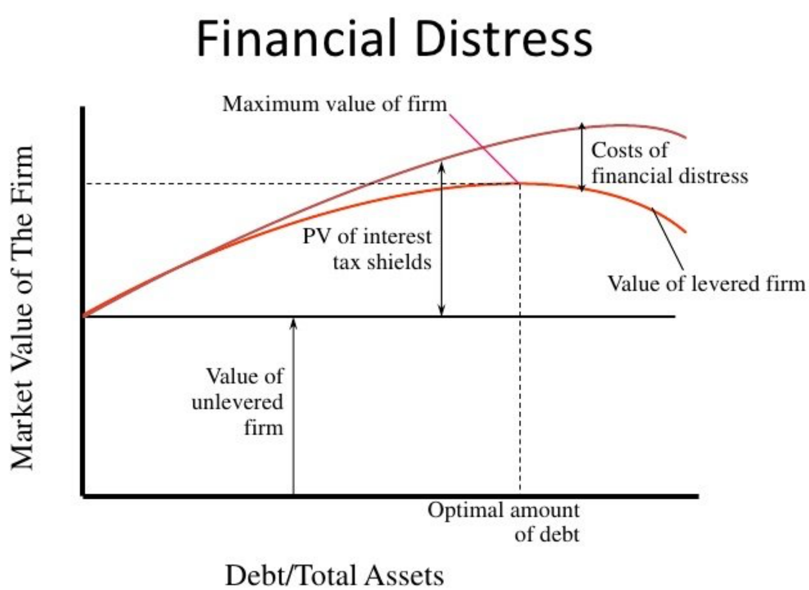

Figure 1 trade-off theory illustrated (Brealey, Myers, & Allen, 2017)

Several studies and researchers have found empirical evidence on the trade-off theory. For example, Flannery and Rangan (2006) found that firms move relatively quickly towards their target debt ratio. Other evidence that firms move towards an optimal amount of debt is from Marsh (1982). In his research, he found that the probabilities of debt and equity issues vary with the deviation of the current debt ratio from the target, which he estimates as the observed average over his sample period sing similar proxies for the target. Adding to this, Taggart (1977) and later Jalilvand and Harris (1984) estimated partial adjustment models and found significant adjustment coefficients, which they interpret as evidence of firms optimizing their debt ratios. Finally, Auerbach (1985) also estimated a target adjustment model but allowed for firm-specific and time-varying targets. He also interpreted the significant adjustment coefficients as support for target adjustment behavior.

However, some studies do not find significant evidence of firms moving towards a target debt ratio. For example, the adverse valuation effects of equity issues or leverage reducing exchange offers do not support the trade-off story (Masulis, 1980). If changes in debt ratios are movements towards the top of the curve (Figure 1), both increases and decreases in leverage should be value-enhancing. Furthermore, Rajan and Zingales (1995) found strong negative relationships between debt ratios and past profitability.

2.2.3 Agency Cost Theory

The third well-known theory, the agency cost theory, was developed by Jensen and Meckling (1976), Jensen (1986), and Hart and Moore (1994). This theory explains and deals with conflicting interests between debt holders, managers, and shareholders. According to the Pecking Order theory, the best capital structure is the ratio between debt and equity with the highest firm value and the lowest agency costs. According to Jensen and Meckling (1976), there are two types of agency costs: the agency cost of equity and debt. Jensen (1986) describes the agency cost theory of equity as being the conflict between managers and shareholders. Jensen and Meckling (1976) add to this that managers try to act in their interest. Even when shareholders can have partly the same interest, there always appears to be a difference between both interests. When managers face excess free cash flow, they can increase firm value, and shareholders return and invest the excess amount of money in non-profitable projects that suit their interest.

This so-called free cash flow theory (agency cost theory of equity) of Jensen (1986) states that managers must invest in a profitable project to generate enough cash to pay debt interest payments when firms have a high debt level. This means that firms with a large amount of cash flow, through increasing debt, reduce agency costs and increase firm value. This is confirmed by Berger and Bonaccorsi di Patti (2006), Margaritis and Psillaki (2010), and Gill et al. (2011), who agreed on the fact that an increase in debt reduces agency cost because managers have no choice but to follow the equity holders interests. Adding to this, Akintoye (2008) stated that when managers act in shareholders' interest, the efficiency and performance of a company improve. Stulz (1990), in contrast, stated that when decreasing cash flow can result in less profitable opportunities compared to companies with high liquidity in the same industry.

Next to the agency cost of equity, the agency cost of debt exists between the interest of equity holders and debt holders. According to Myers (1977), when the debt level rises, the risk of liquidation and underinvestment rises. When risk rises, debt holders demand a higher interest rate on their borrowings to compensate for increased risk, which is the agency cost of debt.

2.3 Financial Firm Performance

Tian and Zeitun (2007) stated that firm performance is related to capital structure. Even though this is the case, there appears to be no explicit agreement on how financial performance should be defined and measured (Kirby, 2005). Different stakeholders need different financial indicators to be able to make decisions. In the literature, measurements of firm performance are generally divided into two groups, being the profitability ratios (accounting ratios and market ratios) (Masha'dhe, Tayeh, Al-Jarrah, & Tarhini, 2015). The most common accounting measures are Return on Assets (ROA) and Return on Equity (ROE) (Tian & Zeitun, 2007; Ebaid, 2009). Return on Assets is measured by the operating performance divided by the made investments (Abeywardhana, 2015). Return on equity shows the success (failure) of the management to maximize the firm's investment in the firm in the form of return (Murhy, Trailer, & Hill, 1996). However, there are limitations to these accounting measures. For example, these measures are highly dependent on accounting standards.

Furthermore, the accounting measures rely on the past instead of looking at the future. Lastly, these measures are susceptible to human errors. Miller (1987) added that these accounting measures are not always reliable because of manipulation by management. To overcome this, Maury (2006) and La Porta et al. (2002) used Tobin’s Q to reflect on the past and look at market expectations. Tian and Zeitun (2007) add to this that Tobin’s Q mixes market value with accounting value and is used to measure the firm's value in many studies, for example, Morck et al. (1988), McConnel and Servaes (1990), and Zhou (2001) used Tobin’s Q to measure firm performance.

2.4 Corporate Life Cycle and Capital Structure

According to the pecking order theory, firms, if possible, prefer internal financing over external financing. However, during the Growth stage of a firm, the firm does not generate enough to be able to finance internally and move to external financing through issuing debt before equity. When firms reach the Mature stage, they generate enough earnings to finance internally and have lower debt ratios than Growth firms. When a firm reaches the Decline stage, profitability declines, and these firms must reissue debt (La Rocca, La Rocca, & Cariola, 2011). This means that, based on the pecking order theory, a High-Low-High debt-equity ratio on firms is to be expected.

In contrast to the pecking order theory, there is the trade-off theory. The trade-off theory assumes that firms should issue debt to reach tax benefits. The disadvantage of this is that the risk of financial distress and bankruptcy risks and costs increases when a firm increases its debt levels. That means that companies search for the perfect balance on maximal tax benefits and minor bankruptcy costs possible. When a firm enters the Maturity stage, they have more tangible assets and are more profitable (Brealey, Myers, & Allen, 2017). This means that investors' risk will not get their money back is lower, and it is easier for firms to issue more debt. When it comes to the Growth and Decline stage firms, these firms have fewer tangible assets and are less profitable. This makes the bankruptcy costs and chance of financial distress higher. Tian et al. (2015) and Ahsan et al. (2016) concluded that Growth and Declining firms, to avoid bankruptcy, issue less debt than the Mature stage firms. This means that according to the trade-off theory, we can expect Growth and Decline stage firms to issue lower debt than the Mature stage firms, which give the expected shape an inverted U-shape, in contrast to the pecking order theory.

The evidence that previous studies confirm the corporate life cycle influences capital structure determinants. For example, Frielinghaus et al. (2005), in their research of South African companies, found a significant relationship between capital structure and the corporate life cycle, supporting the pecking order theory of a high, low, high leverage ratio. This means that firms in the Growth and Decline stage relatively issue more debt (35% and 40% respectively) than firms in their Prime (or Mature stage in this research, 22%) stage. Another research, the research of La Rocca et al. (2011) in their research on strategic financing choices through the corporate life cycle of Italian SMEs. They found that when companies grow through their life cycle stages, they change financial decision-making and financial strategies. They found that firms in the Growth stage prefer to issue debt because they cannot finance internally and depend on investors. On the contrary, they found that Mature firms generate enough earnings to finance internally and are less dependent on external financing. This means that La Rocca et al. (2011) found that firms in their early life cycle stages are more dependent on debt, and as they grow through later stages, they can finance internally. They also found that this effect accounts for different industries. When looking at the research of La Rocca et al. (2011), one can conclude that this follows the pecking order theory pattern. Another evidence on the relationship between capital structure and the corporate life cycle is Tian et al. (2015) research on Chinese public manufacturing companies, which found that these companies significantly change their debt-equity ratio when they pass through the firm life cycle stages. They also report that firms in the Growth and Decline stage are more reliant on issuing debt than Mature stage firms. This is because (following the pecking order theory), so they move to issue debt in contrast to Mature firms. In their research on Pakistani firms, Ahsan et al. (2016) found that in line with the trade-off theory, Growth and Decline firms tend to have low leverage ratios, and Mature firms have high debt ratios. Concluding from all these studies, they state that the corporate life cycle is an important determinant of how companies adjust their leverage levels.

2.5 Capital Structure and Firm Performance

A large body of research has been done on the influence of capital structure on firm performance. However, the findings of the studies are contradicting. For example, Abor (2005), Margaritis and Psillaki (2010), Gill et al. (2011), and Le and Phan (2017) show that there is a positive and significant relationship between capital structure on firm performance. This means that the more debt a firm issue, the higher the firm performance. This is in line with the agency cost theory, which states that managers must invest in a profitable project to generate enough cash to pay debt interest payments when a firm increases debt. This means that firms with a large amount of cash flow, through increasing debt, reduce agency costs and increase firm value. However, some studies found a negative relationship between Capital structure and firm performance. For example, Tian and Zeitun (2015), Umar (2012), Stephen (2012), and Vatavu (2015) found that when a firm increases debt, firm performance becomes negative. This is not in line with any of the three treated theories. However, Lin and Chang (2009) found that when a firm has a certain amount of debt, it increases firm value, but when a firm has more debt than that specific level, the relationship becomes hostile again. This is in line with the trade-off theory, which suggests that firms search for a balance between interest tax shields and incremental costs in debt financing. Finally, Ebaid (2009) found no relationship between capital structure and firm performance. The variables chosen mainly by the studies are Short-term debt, Long-term debt, and Total debt to measure the capital structure. Furthermore, Return of Equity, Return on Assets, and Tobin's Q are primarily used to measure firm performance.

2.6 Hypothesis Formulation

This section develops the hypothesis based on theories and empirical evidence. The chapter is divided into three sections. Hypothesis based on the corporate life cycle and capital structure. Hypotheses based on capital structure and firm performance, and hypotheses based on the role of the corporate life cycle on the relationship between capital structure and firm performance.

2.6.1 Corporate Life Cycle and Capital Structure

Existing literature such as Ahsan et al. (2016) and Anthony and Ramesh (1992) classify the company life cycle into three stages: Growth, Mature, and Decline. During the Growth stage, the company seeks new investment opportunities and business expansions, but the company's profit is not very stable yet. This means that the company needs external funding to keep growing and support some investment activities. Generally, as the average Growth sales are relatively high, this stage has a positive relationship with the capital structure. The company's financial behavior on these stages is consistent with Jensen and Meckling (1976), who argued that internal funds are vital for a company in its early stage, depending on the external fund, such as debt. They also added that the company needs a high cost to invest and maintain its Growth in the first stage.

During the Mature stage, the company faces a more stable and high profit and sales level. During this stage, companies fund internally and use their cash flows to pay off their debt. During this stage, sales Growth is lower than during the Growth stage, suggesting a negative relationship with capital structure. During this stage, the Growth remains positive but declining. It is the first stage recognizing that the Growth is declining. At this stage, the company tends to strengthen its position with a considerable amount of cash flows. Harris and Raviv (1991) argued that the vast amount of cash flows without a reasonable prospect of investment creates a source of consumption, inefficient expenditures, and other unproductive activities.

Finally, during the Decline stage, the company faces lower cash flows, investment opportunities, and negative sales Growth. To continue existing, the firm needs to move to external financing. This means that the Decline stage has a positive relationship with capital structure. Jensen and Meckling (1976) found that managerial stock ownership can reduce interest conflicts between managers and shareholders. However, managerial ownership at some middle ranges may lead to managers' entrenchment, which may lead to expropriation of investor wealth.

At high levels of managerial ownership, the alignment effect may lead to reducing agency cost. Debt acts as a control mechanism to reduce managers' freedom in deploying free cash flow on harmful net present value projects. Based on these findings, the first hypothesis of this study is formulated as:

Hypothesis 1*: During the Growth and Decline stage, firms have relatively higher leverage compared to firms in the Mature stage.*

2.6.2 Capital structure and firm performance during corporate life cycle stages

Existing literature such as Anthony and Ramesh (1992), Frielinghaus et al. (2005), Ahsan et al. (2016), and La Rocca et al. (2011) classified the company life cycle into three stages, Growth, Mature and Decline (or similar to this). During the Growth stage, companies seek investment opportunities to keep growing and make their products more known to potential customers; Growing firms tend to have high R&D and advertising investments compared to other firm stages (Dickinson, 2011). In this stage, firms finance their investments through external financing (Grabowski & Mueller, 1975). Next to raising external funds, firms in this stage invest all their profits back into the organization. This is confirmed by Frielinghaus et al. (2005), who adds that firms need this external financing to keep their sales output growing. External financing can be both debt and equity financing. According to the pecking order theory by Myers (1984), firms prefer debt financing over equity financing since debt signals the board's confidence that investment is profitable and that the current stock price is undervalued. For this reason, the Growth stage has a positive relationship to the capital structure since Growth firms, according to the literature, need external financing for their investments. The significant positive relationship between the Growth stage and capital structure suggests a positive impact on firm performance.

The second stage in the corporate life cycle is the Mature stage. Over time, as firms continue to innovate and become Mature, they accumulate profits and have higher retained earnings in their capital mix (Owen & Yawson, 2010). Companies face a more stable sales Growth compared to Growing firms. Since there is more competition for a Mature firm, Miller and Friesen (1984) argue that these firms take less risk than young firms. Wernefelt (1985) adds that Mature firms invest in maintaining capital instead of investing in capital.

Furthermore, they generate enough cash from operations to finance internally, and profitability and size appear to be maximized during this stage (Dickinson, 2011). Here, the Pecking Order theory and empirical evidence suggest that these firms needless to nonexternal financing, which means that a negative relationship between the Mature and capital structures is expected. This relationship suggests that the Mature stage has a weaker relationship with firm performance than the Growth stage firms since leverage and firm performance have a positive relationship.

The final stage in the corporate life cycle is the Decline stage. When a firm faces reduced Growth, declining sales, and low profitability, they enter the Decline stage's final stage (Dickinson, 2011). There is no more innovation, and there are no external challenges (Miller & Friesen, 1984). According to Wernefelt (1985), Growth rates Decline, and prices also fall. Following this, these firms lose market share swiftly. These firms do not invest in innovation since they want to keep their resources. Even though they try to save resources, they cannot produce enough resources to survive (Adizes, 1979). To overcome this of having too little internal resources and go bankrupt, Declining firms tend to move to external financing (Frielinghaus, Mostert, & Firer, 2005). This suggests that the Decline stage has a positive relationship to the capital structure since Declining firms, according to the literature, need external financing to survive. This relationship suggests that Decline firms have a stronger positive relationship of capital structure on firm performance than Mature stage firms.

This positive, negative, positive, or U shape aligns with the Pecking order theory, which states that a firm prefers internal financing over debt and equity financing. When a firm has enough funds, they finance internally. When a firm faces a need for funds, they move to external financing to prefer debt over equity. (2011)In their research of SMEs in Italy, La Rocca et al. (2011) found that young firms (or Growth firms), because of Information asymmetry, insufficient earnings tend to issue debt to finance investments. They added that early-stage firms need funds for business activities and are more dependent on external financing to support their business. They also found that middle-aged (Mature) firms have higher profitability, making them less dependent on external financing. They found that companies earn enough to finance internally, and these firms also issued less debt in their research. Frielinghaus et al. (2005) had similar research to La Rocca et al. (2011), where companies in the early (Growth) corporate life cycle stage issued more debt compared to Mature firms. They also found that firms in the Decline stage start to reissue debt, which is in line with the Pecking order theory. Pinkova and Kaminkova (2012) and Tian et al. (2007) had the same results and found that Growth and Decline firms had higher debt-equity ratios than Mature firms. Based on the Pecking Order theory and findings, the second hypothesis of this study is formulated as:

Hypothesis 2: ***Impact of capital structure on firm performance is stronger during Growth and Decline stage compared to firms in the Mature stage.***

3. Research Methodology

3.1 Introduction

This chapter discusses the research methodology used in this study. The first part explains which variables are used and how they are measured. After this, to answer the research question and test the hypotheses, the empirical model and research methods used in this study are shown. Three response variables have been used to determine a firm's performance. These are ROE (Return on Equity), ROA (Return on Assets), and Tobins' Q. Other variables have been used as explanatory variables. Their primary purpose is to describe in detail the capital structure of a firm. These variables are short-term debt, long-term debt, and total debt. For the control variables, five important variables were chosen. Each of these has a significant influence on a firm's performance. Therefore, they are the best in determining the level of Growth for that firm. The variables include Risk, Tangibility, sales Growth, asset Growth, and size. Table 2 below shows all the variables and their abbreviations that will be used for the rest of this section.

3.2 Capital Structure Variables

To find out about a firm's capital structure, total debt is used. Short-term debt and long-term debt are used as robustness checks. Most researchers have used this method (Abor, 2005; Tian and Zeitun, 2007; Ebaid, 2009; Gill et al., 2011; Umar et al., 2012; Vatavu, 2015; Le and Phan, 2017). These ratios can be acquired by utilizing the variables of market value, book value, or both values. Leverage was determined as a ratio using the book values of short-term debt to the book value of total assets, book value of long-term debt to the book value of total assets, and book value of total debt to the book value of total assets. The findings in this research have only taken the book value of leverage into account following the studies of Abor (2005), Ebaid (2009), Margaritis and Psillaki (2010), and Gill et al. (2011). It has been done so because of limited data available.

3.3 Performance Variables

To determine the financial performance of a given firm, the main variables used include ROE, ROA, and Tobin's Q. Two accounting ratios are commonly used for measuring a firm's performance (Abor, 2005; Ebaid, 2009; Gill et al., 2011; Vatavu, 2015). These ratios are; return on assets and return on equity. Another ratio determines past or future market expectations. This ratio is Tobin's Q, and several researchers have used it for several market studies in the past. In past studies, it is difficult to find the procedures used to measure ROE and ROA. There are several instances where earnings before interests and taxes have been used to calculate these values (Umar et al., 2012). However, there is another group of researchers that preferred using net income over gross income. Operating profit (EBIT) is derived by calculating the final value of a firm's revenue after all the expenses have been subtracted. It is crucial to note that all taxes and accrued interests are eliminated from EBIT calculations.

For an organization's net income, all acquired interests and taxation values are deducted from the final earnings to determine the company's total earnings. In this analysis, the values used were the net income. EBIT values were used to determine the strength of companies. In this study, ROE is obtained by dividing the net income by all the shareholders equity for each year. ROA is obtained by dividing the EBIT by total assets for each year. Tobin's Q is obtained by adding the market value of equity with the book value of debt. The result is then further divided by the recorded values of all the assets for each year.

3.3. Control Variables

In various research, five variables have been commonly used as the control variables in determining a firm's performance. They are Tangibility, growth in sales, risk, size, and growth in assets. All these variables have a significant influence on the fiscal percentage of a firm. In this paper, all these variables have been used. They all help explain how a firm can be affected. For instance, when the level of risk is very high in a company, it causes detrimental effects to the entire firm. The company begins to undergo a lot of financial distress, which negatively affects its performance (Tian and Zeitun, 2007). Future actions and strategic plans become very difficult for the organization (Bloom and Milkovich, 1998). These adverse effects hitting the organization make it difficult for future growth and expansion.

To calculate risk, the standard deviation of net income was divided by the total assets (Titman and Wessels, 1988). The value was obtained as a ratio. In calculating the standard deviation, a period of four years was used. On the other hand, Tangibility is measured as the ratio of tangible fixed assets to total assets. Substantial assets can act as collateral for an organization. It helps to reduce agency costs and improves overall firm performance. The cost of operation over a time (t) divided by operational costs over time (t-1) calculates the increase or decline in sales (Akguc et al., 2015). Total assets of time (t) divided by total assets of time (t-1) calculates the growth in assets. This measurement determines the annual Growth rates of assets (Salim & Yadav, 2012). Higher growth is a clear sign that the firm is progressing positively. The company can create extra earnings from its investment opportunities (Le and Phan, 2017). The size of a firm was calculated using the natural logarithm of total assets owned by a firm. Several researchers contradict each other when it comes to determining the effect size of a firm's performance.

Large firms are expected to be more diversified and have better management (Margaritis and Psillaki, 2010). The large size is supposed to enable the firm to increase its performance. Compared to smaller companies, large companies can gain access to a more significant portion of the market. They can also gain access to funds and borrow at better interest rates (Ferri & Jones, 1979). However, large firms experience organizational complexities. Management might experience inefficiency problems that result in lower performance of the firm (Williamson, 1967). This disparity is what brings conflicting results in terms of performance to size.

Variable	Definition
Return on Equity NI (ROE)	Net income / Shareholders Equity
Return on Assets EBIT (ROA)	Earnings before Interests, Taxes / Total Assets
Tobin's Q	(Market Value of Equity + Book value of Total Debt) / Book value of Total Assets
Book value short-term debt (STD)	Short-term debt / Total Assets
Book value long-term debt (LTD)	Long-term debt / Total Assets
Book value total debt (TD)	Total debt / Total Assets
Risk (RK)	Standard Deviation (Net income / total assets)
Tangibility (TAN)	Tangible fixed assets / Total assets
Growth in Assets (GA)	Total assets of time (t) / Total assets of time (t-1)
Growth in Sales (GS)	Operating revenue of time (t) / operating revenue of time (t-1)
Size (SZ)	Natural log of total assets
Growth Dummy	Dummy variables: takes the value of 1 for a particular life cycle stage, otherwise 0.
Mature Dummy	Dummy variables: takes the value of 1 for a particular life cycle stage, otherwise 0.
Decline Dummy	Dummy variables: takes the value of 1 for a particular life cycle stage, otherwise 0.

Table 2 Definition of Variables and Abbreviations Used

3.4. Model

In order to recognize how the corporate life cycle affect capital structure and how capital structure affects the performance of a firm, multiple regression analysis was conducted on the available data. The study used unbalanced short panel data. These included a large number of data set (n = 2215) over a short period (t = 7 years). All the entities do not include the same time observations. For economic research, panel data has added advantages over the usual time-series or conventional data. Those advantages are as follows: The data provided is large. This huge dataset reduces similarities in explanatory variables, and the degrees of freedom are increased (Hsiao, 1986). The efficiency of estimating economic metrics is also increased. Panel data also has the capabilities to measure effects when compared to cross-sectional or time-series models. It also can create a better understanding of the dynamics of adjustment. The stated hypotheses can be answered by two models given as:

Hypothesis 1:

LEV=B0+B1lifecycle+B2Z

Where:

LEV = Leverage ratio

B0 = Constant

B1lifecycle = Corporate life cycle dummy

B2Z = Control variables

Hypothesis 2:

PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z

Where:

PERF= Performance variables

B0 = Constant

B1Lev = Leverage ratio

B2lifecycle = Corporate life cycle dummy

B3lev*lifecycle = Leverage ratio * Corporate life cycle dummy

B4Z = Control variables

By breaking down the above formula, it can be deduced that PERF is a representative of performance measures (ROE, ROA, and Tobin's Q). LEV is a vector of the capital structure ratios. These are total debt, long-term debt, and short-term debt compared to the book value of the total assets. All control variables without intercept terms are represented by Z.

In order to reduce omitted variables bias, variable intercept models that introduce time and type-specific effects were used. The fixed-effect model was deemed more efficient than the random-effects model because the industries used are a small sample of the overall industrial population in Germany. According to the results of the Hausman test conducted on the null hypotheses, it can be determined that the null hypotheses have been rejected and that the fixed effect model is not correct. Both the general model and the quadratic expression were used to verify the null hypothesis. Every firm has its operational procedures that help them organize its capital structure. This ability will, in turn, affect the performance of the firm. Running regression tests on both models without considering the effects of autocorrelation and heteroskedasticity could lead to invalid results. The standard error of one period was compared to the standard error of another. This measurement is how autocorrelation is determined in the models. On the other hand, heteroskedasticity occurs when the standardized residuals are different across the values of an independent variable. Wald test for group-wise heteroskedasticity and Wooldridge's tests for fixed regression models have been carried out on both models to verify that autocorrelation and heteroskedasticity are present in the null hypotheses. Their presence led to the null hypotheses being rejected. The models were adjusted, and robust standard errors were used for the regression analyses instead to increase the reliability of the results.

3.4.1. Ordinary Least Squares Regression

A regression analysis aims to analyze the relationship between one or more independent variables and a dependent variable. One of the most used regression analyses is the ordinary least squares regression. The regression model has an intercept which is B0. This intercept shows how much the dependent variable changes when the independent variables have a value of zero. The following term, B1, shows how much the dependent variable changes because of the independent variable.

The Ordinary least squares regressions need to meet a few assumptions: normality, homoscedasticity, linearity, and no multicollinearity before the regression can be carried out. Furthermore, the sample size must be large enough, and the variables must be metric (Hair, Black, Babin, & Anderson, 2014). One of the advantages is that the OLS regressions can add multiple independent variables. There is a disadvantage, however, which is the endogeneity problem. The OLS regression is used in a variety of literature. For example, Faff et al. (2016), in their study on the impact of corporate life cycle on corporate policies, used OLS regressions. When using OLS estimation, they used clustered standard errors to research the influence of the corporate life cycle on corporate policies. This model included the regression of corporate policies (which in the study of Faff (2016) are Capital expenditures, equity issuance, cash holdings, and long-term debt issuance) on a group of independent variables. Adding to this, they used the corporate life cycle stages as dummy variables so that they were able to research the influence of the corporate life cycle on corporate policies.

Another research that applied the OLS regression is the study of Akthar (2012). In her study, she applied both OLS and fixed effects models to investigate whether the different stages of the business cycle impact the relative importance of the unobserved permanent component of the leverage ratios, which is comparable to the corporate life cycle when it comes to regression models. In her study, she used five models where long-term debt is regression on multiple independent variables. Like Faff et al. (2016), she used dummy variables for the business cycle. This means the dummy variable takes one if the firm is in that phase and zero otherwise. To examine if these phases of the business cycle impact the relative importance of the unobserved permanent component of the leverage ratios, they analyzed the regression coefficients of the business cycle dummies and adjusted the R squared of the models. Finally, the research of Habib and Hasan (2019) evaluated during different corporate life cycle stages performance and corporate risk-taking consequences. To control for industry effects, they added dummies for both effects in their OLS regressions.

3.4.2. Fixed Effect Regressions

Fixed effect models include time-specific and firm-specific heterogeneity, in contrast to OLS regressions. Fixed effect regressions have parameters that are fixed. This means that this model takes individuality into account by allowing the intercept to differ per company, and it holds the slope and coefficients constant across companies. Also, by applying fixed effects, this model controls for correlation between the independent and the omitted variables. The advantage of the OLS regression is that it takes individual heterogeneity into account (Hair, Black, Babin, & Anderson, 2014). Fixed effects regression, as stated before, include time-specific and firm type effects in the regression equation to reduce bias (La Rocca, La Rocca, & Cariola, 2011). Akbar et al. (2013) added that another advantage of fixed-effect models is that they take unobserved heterogeneity. This means that the chance of biased results is lower. There is a disadvantage, though: fixed effects do not include the involvement of time-invariant independent variables in the model because if they are removed from the analyses. In their study, La Rocca et al. (2011) research whether the corporate life cycle is relevant in a company's financing behavior used fixed effects regression. Another research, the research of Akhtar (2012), used both OLS and fixed effects regression to research if the business life cycle has an impact on the relative importance of the unobserved permanent component of the leverage ratios. Ahsan et al. (2016) researched the impact of certain factors on the capital structure during life cycle stages and used fixed effects panel data models. Furthermore, Tian et al. (2015) researched the impact of the corporate life cycle on capital structure and used fixed-effects panel data.

3.4.3. Classifying Corporate Life Cycle Stages

As stated before, there are (among others) three commonly used base methods in the literature. Other studies mostly use these methods or base their methods on one of these three methods. The method chosen in this study is the cluster analysis method of La Rocca et al. (2011) and Keasey et al. (2015) to classify firms in the Growth, Mature, and Decline stage. These studies used two-step cluster analyses to classify firms in their respective corporate life cycle stage. Two-step cluster analysis maximizes variability between and minimizes variability within clusters. La Rocca et al. (2011) state that this analysis makes groups within data usually not easy to see. The number of clusters can be fixed, or it can be determined automatically. Automatic is preferred because, this way, cohesion, and separation (cluster quality) are higher. The measure shows whether the clusters lie far from each other or very close (ranging from -1 to 1). A coefficient of 1 means that the clusters are far away (which means they are different from each other), a value of -1 means the sample is classified in the wrong cluster, and a value of 0 means the clusters are similar. This study research three life cycle stages, being Growth, Mature, and Decline. Therefore, three clusters are used in this analysis. When the automated analysis gives more (or fewer) clusters, a fixed amount of three clusters is chosen. Another advantage of using this cluster analysis is that categorical and continuous variables can be used. The variable chosen in this research are age, sales growth, and retained earnings by total assets and are chosen since a large body of literature (Miller and Friesen (1984), Anthony and Ramesh (1992), DeAngelo et al. (2010), Keasy et al. (2015), Faff et al. (2016), Ahsan et al. (2016), and La Rocca et al. (2011), used (some or among others) these variables to classify firms in their corporate life cycle in their studies. The variables are chosen in line with the corporate life cycle theory.

Age is chosen in line with La Rocca et al. (2011) because younger companies tend to have more new products and higher sales Growth (Anthony & Ramesh, 1992). According to Anthony and Ramesh (1992), sales growth decreases when a firm moves through the corporate life cycle. This means that the Growth stage firms have a relatively high sales growth compared to Mature (medium) and Decline (low) stage firms. The third classification variable is retained earnings scaled by total assets (RETA). RETA measures whether a firm can finance internally or need external financing. According to the Pecking Order theory and DeAngelo et al. (2010), small firms have a low RETA measure, while Mature firms can finance internally because of high cash flows and fewer investment opportunities and have a high RETA measure. When the cluster analysis is done, a new variable being the "corporate life cycle" variable, is created. This means that every stage (and thus firm in the respective stage) gets a number 1 (Growth), 2 (Mature), or 3 (Decline). To measure whether the differences in the groups are statistically significant, an ANOVA test is carried out.

3.4.4. Capital Structure Measure

Various research measure the capital structure. The three most used measures are Long-term book leverage (La Rocca, La Rocca, & Cariola, 2011), Short-term book leverage (Rajan & Zingales, 1995), and Total debt leverage (Gill, Biger, & Mathur, 2011). For example, in their studies of capital structure on firm performance, Tian and Zeitun (2007), Abor (2005) and Gill et al (2011) used these measures in their studies. In their studies of corporate life cycle on capital structure, La Rocca et al. (2011), Rajan and Zingales (1995), and Ahsan et al. (2016) also used (some of) these measures. In the literature, the most used ratio is the total debt ratio. Since this is the most used measure in the literature, this study also used the total debt ratio. As robustness checks, Long-term book leverage and Short-term debt leverage are used, which is in line with Rajan and Zingales (1995), La Rocca et al. (2011), and Gill et al. (2011).

4. Data and Sample

This chapter explains how the data for this research is retrieved and what the criteria for the sample are. To research if the corporate life cycle influences the relationship between capital structure and firm performance, this research chose to use data of German listed companies. Germany is chosen since this is one of the most developed countries with the highest GDP in the world. The hypothesis (see hypothesis section) is based on a developed country. Also, data for Germany is available. The data is collected through the Orbis database delivered by Bureau van Dijk and accessible through the University of Twente, which has a license. The advantage of this database is that it contains financial and non-financial data needed for this research. The first step in retrieving data is to select the right companies. The companies selected are German-listed non-financial firms. This has to do with the fact that financial, utility, and real estate industry firms have significantly different leverage ratios than their non-financial counterparts, which might affect the research. This is in line with Tian et al. (2007) and Faff et al. (2016), who also did not use these companies. For example, these firms (for example, banks, insurance companies, and pension funds) have a different leverage ratio because of specific laws and industry rules (Rajan & Zingales, 1995). The sample period is the financial years of 2012-2018. This period is chosen to be sure a measure of risk is included, and all data is available since data of 2019/2020 is not fully available yet. Furthermore, there is no empirical evidence of the influence of capital structure on firm performance during different life cycle stages on German firms after the financial crisis. However, to compare results of the relationship between capital structure and the corporate life cycle and the relationship between capital structure and firm performance like other studies, this study focuses on listed companies. Another requirement for the data sample is that all the data needed to calculate and measure the variables of this study (dependent, independent, and control) must be available in Orbis for the whole sample period. When specific data of a company is not available, the company is excluded. The reason for this is that this makes the sample data panel data. Panel data makes it possible to combine time-series observations and cross-sectional observations. This means that panel data next to variations between companies also include a variation of a company over time. This means that the data accounts for heterogeneity and it controls for the impact of omitted variables. Taking the sampling criteria into account, the sample size of this study consists of 317 German companies with a total of 2215 firm-year observations. Industries are based on the classification of the Nace Rev. 2, which is a European standard classification list.

In the empirical model, the industry variable is added to control for industry fixed effects. To be able to do this, the industry needs enough observations. To ensure there are enough observations per industry, the original amount of 9 industries is reclassified in four main industry groups. As shown in Table 3, the major industry firms belong to is the Manufacturing industry with 56.7%. Since the share of manufacturing firms is significantly high, it is assumable that this industry has a significant influence on the variance of the results. Because of this, a dummy variable manufacturing is included. The dummy will have a value of 1 when a firm belongs to the manufacturing industry and 0 otherwise. Another dummy, the information and communication dummy, is also included. This industry dummy accounts for 17.3%. It will also take a value of 1 when the company belongs to this industry and 0 otherwise. The third industry dummy in this research combines the industries mining and quarrying, construction, wholesale and retail trade, and transportation and storage. It will be the Mining, construction, retail, and transport dummy variable, which takes a value of 1 if the company belongs to one of these industries and 0 otherwise. The final dummy variable is also a combination, which exists of the industries Professional, scientific and technological activities, administrative and support service activities and arts, entertainment, and recreation industries and is called the other service companies dummy which also takes a value of 1 if the company belongs to one of these industries and 0 otherwise. The table below shows the reclassification of the industries. For the regression, other service companies are dropped to avoid multicollinearity problems.

Industry classification Nace Rev 2.	Frequency	Reclassification	% of total
C - Manufacturing	1258	Manufacturing	56.7%
B - Mining and quarrying	32	Mining, Construction, Retail and transport	15.9%
F - Construction	32		
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	176		
H - Transportation and storage	112		
J - Information and communication	381	Information and Communication	17.3%
M - Professional, scientific, and technical activities	112	Other service companies	10.1%
N - Administrative and support service activities	56		
R - Arts, entertainment, and recreation	56		
Total	2215		100%

Table 3 Industry reclassification

5. Results

This part of the study contains the results. The chapter is divided into several subchapters were. The first part explains the univariate analyses. The next part shows the results of the bivariate analysis and the correlation matrix. After this, the multivariate analysis, including the regression results, are included. Finally, robustness test results are shown in the appendix.

5.3. Univariate analysis

The univariate analysis of this study is Table 4, which contains the descriptive statistics. The dependent, independent, and control variables used in the regression analysis in the following chapters are included in the descriptive statistics. The table shows the number of observations, the mean, the median, the standard deviation, the minimum, and the maximum. To make sure outliers do not affect the findings, I follow La Rocca et al. (2011), Faff et al. (2016), and Akhtar (2012) by winsorizing at the 1% level. This is done for the dependent and control variables.

	Variable	**Mean**	**Median**	**Minimum**	**Maximum**	**Standard Deviation**	**Number of Observed Data**
Firm performance Variables	ROE	-0.0003	0.088	-165.36	50.94	3.97	2215
	ROA	0.046	0.059	-3.00	0.80	0.153	2215
	Tobin's Q	4.72	4.66	-4.10	9.91	2.03	2215
Capital structure variables	TD	0.53	0.53	0.0087	1.41	0.20	2215
	LTD	0.24	0.22	0.0000	0.84	0.16	2215
	STD	0.29	0.27	0.0000	1.06	0.15	2215
Control Variables	RK	0.038	0.017	0.0004	0.50	0.060	277
	TAN	0.22	0.18	0.00	0.95	0.20	2215
	GS	0.29	0.023	-1.00	349.33	7.66	2215
	GA	-0.042	0.17	-15.52	0.89	1.21	2215
	SZ	12.67	12.39	5.59	20.08	2.43	2215

Table 4 Descriptive statistics after winsorizing dependent and control variables at 1% level.

5.3.1. Firm performance variables

The first variable in the table are the firm performance variables. These variables are measured by Return on equity, return on assets, and Tobin's Q. These variables have 2215 observations. The variables explain that a higher return on equity, return on assets, and a higher Tobin's Q means a higher firm performance. Results in the table show that ROE has a mean of -0.0003 and a median of 0.088. Showing that on average firms have a negative ROE. ROA has a mean of 0.046 and a median of 0.059. Return on Assets show the efficiency of a firm relative to its assets, where on average the firms in this sample have an efficiency of 4.6%. This finding is slightly higher than the findings of Tian and Zeitun (2007) who found a value of 1.9%.

Finally, Tobin’s Q has a mean of 4.72 and a median of 4.66. Overall, this suggests that German listed firms have a positive performance. Tobin’s Q showing the market to book values has a higher ratio than 1. This suggests that on average the market expects these firms to grow, since expected future earnings are taken into account in the current market price.

5.3.2. Capital structure variables

Capital structure variable is measured by total debt, long-term debt, and short-term debt. These variables have 2215 observations. The variables explain that a higher value means that a firm issues more debt (total, long-term, short-short-term) equity ratio. The total debt ratio, which consists of long-term debt and short-term debt to equity, has a mean value of 0.53 and a median value of 0.53. This means that approximately 53% of the firm's financial structure consists of debt. For long-term debt, the mean (median) has a value of 0.24 (0.22). The last capital structure variable, the short-term debt ratio, has a mean (median) of 0.29 (0.27), which is slightly higher. On average this suggests that firms when issuing debt, issue more short-term debt that long-term debt.

These values are in line with Akhtar (2012), who found a mean (median) long-term debt ratio of 0.26 (0.24). However, the total debt ratio in this research is slightly higher than in other studies. La Rocca et al. (2011) found a mean (median) value on the total debt ratio of 0.45 (0.50); adding to this, Tian et al. (2015) found a median value of 0.46. There are also total debt ratios that are much lower than this study. For example, Faff et al. (2016) and Castro et al. (2016) found a mean (median) value of 0.25 (0.19) and 0.21 (0.18) respectively. Every study has differences between total debt ratios because these studies use different periods, companies (financial), and different countries. For example, Castro et al. (2016), in their period of 1990-2012, used quoted firms of 14 countries in Europe. Furthermore, Faff et al. (2016) used 1973-2014 in their study on US firms. These two studies, in contrast to this study, include a few well-known events like the dot com bubble and the global financial crisis of 2008.

5.3.3. Control Variables

Control variables for this research are risk, firm size, tangibility, sales growth, asset growth, and the dummy variable industry. Table 4 shows that risk has a mean value of 0.038 and a median value of 0.017, which is a little bit lower but still in line with Castro et al. (2016), Akhtar (2012), and La Rocca et al. (2011), who found mean (median) values of 0.07 (0.10), 0.09 (0.12) and 0.10 (0.09) respectively. Another controlling variable in this study is firm size. Total assets measure firm size. A natural log on firm size was taken to correct their skewness which is in line with other studies. Log results are shown and mean (median) value is 12.67 (12.29). When it comes to Tangibility, Tangible fixed assets to total assets, the mean (median) value is 0.22 (0.18). Since the mean value is also larger than the median for this variable, it can be concluded that this measure is right-skewed. These values are in line with for La Rocca et al. (2011) , Akhtar (2012) and Castro et al. (2016) who found a mean (median) value of 0.22 (0.19), 0.34 (0.29) and 0.27 (0.22) respectively. Sales growth is positive with a mean (median) value of 0.29 (0.023) and asset growth is slightly negative with -0.042 (0.17).

5.3.3 Cluster analysis

This part of the study elaborates on the cluster analysis. This research used the automated procedure to determine the number of clusters. This analysis already showed three clusters in line with the number of dummy variables (Growth, maturity, and Decline). The so-called silhouette measure of this cluster has a coefficient of 0.7 (appendix A) which states that the cluster is considered 'good'. This coefficient suggests that the clusters are significantly distant from each other. The variables used for the cluster analysis (age, RETA, and sales Growth) divided in each corporate life cycle stage are shown in Table 5. The results are in line with the theories and predictions already discussed.

The first variable, logarithm age is relatively low during the Growth stage (1.29 and 0.20) higher in the Mature stage (1.36 and 0.20) and the highest in the Decline stage (2.06 and 0.16). This suggests that firms in the Growth stage are relatively younger than during the Mature and Decline stage. The second variable, RETA, is very low, with -6.00 in the Growth stage and much higher in Mature and Decline firms (0.05 and 0.23, respectively). This suggests that when firms become older, they have declining investment opportunities, and these companies are more self-financing. The last variable, sales growth, shows a declining pattern. There is a continuous drop in sales growth from relatively high to relatively low (8.37 for Growth, 0.07 for Mature and 0.04 for Decline stage firms), which was predicted. The difference between Mature and Decline stage firms is minimal. These results are in line with Ahsan et al. (2016). Another finding in the table is the statistically significant difference in the mean between the corporate life cycle stages.

As can be seen from table 5 the distribution between corporate life stages is 2.8%, 55.9%, and 41.3% for the Growth, Mature, and Decline stages, respectively. These findings are not uncommon since other studies also found the Mature (or similar) stage to have the largest share in their sample. For instance, Castro et al. (2016) found 19%, 48%, and 33% for in their case Introduction, Growth and Mature stage. Furthermore, Ahsan et al. (2016) found 20%, 74%, and 6% for Growth, Mature, and Decline stage firms. Adding to this, Keasey et al. (2015), in their study, found 12%, 77%, and 11% for Growth, Mature, and Revival stage, respectively. A study classified the first stage as the most critical stage being La Rocca et al. (2011) with 45%, 40%, and 15% in young, middle-aged, and old firms. Since La Rocca et al. (2011) used small and medium-sized firms that are not involved in a bankruptcy process its can be expected that Growth and Mature share are higher than for this Study. The difference is that listed companies are generally large and most likely already left the Growth life cycle stage. This also explains the fact that this study only includes 2.8% of firms in the Growth stage. As can be concluded from this sub-chapter, the cluster quality is in line with other studies, and the cluster's quality appears to be ‘good’. Adding to this, the mean differences are statistically different. This suggests that the clusters that are formed during this analysis are valid and valuable for the research.

Classification variables	Growth stage		Mature stage		Decline stage		ANOVA test on the mean difference (F test and p-value)
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	
Log_Age	1.29	0.20	1.36	0.20	2.06	.16	4101.916***
RETA	-6.00	3.49	0.05	0.42	0.23	0.21	2517.016***
Sales Growth	8.37	45.71	0.07	0.43	0.04	0.40	36.014***
# of observations	61		1239		915		
% of total observations	2.8%		55.9%		41.3%		

*Table 5 Descriptive statistics for classification variables and results of ANOVA test on mean difference where: *** is mean difference is significant at 0.01 level.*

5.3.4. Descriptive statistics and ANOVA Test on the Mean Difference

Table 6 includes the descriptive statistics during each corporate life cycle. This table also includes the ANOVA test on mean differences. This ANOVA test has been carried out to research if there is a significant difference between the corporate life cycle stages and the variables (independent, dependent, and control). When looking at the firm performance variables, return on equity (NI), Return on assets (EBIT), and Tobin's Q, a few things can be seen. First, the mean difference is significant between the corporate life stages. Return on equity and return on assets for the Growth stage appear negative (-0.29 and -0.29 respectively), and Tobin's Q is positive with 4.92. For Mature (Decline) stage, Return on Equity is negative (positive) with -0.05 (0.08), return on assets is 0.051 (0.062) and Tobin's Q 4.92 (4.44).
For Return on equity, there seems to be no significant difference between the stages. This suggests that for the performance indicator return on equity it does not significantly matter whether a firm is in the Growth, Mature or decline stage. However, since the results are . Based on ROA results it is shown that during the Growth stage, firms are relatively less efficient (ROA: -29%) than both Mature and Decline stage firms (5.1% and 6.2% respectively). These findings are in line with Koh et al. (2015) who state that at first firms do not generate enough capital form their own process. When growing larger, they state that firms start to become more efficient and latest due to the need for restructuring firs try to be as efficient as possible. Hence the difference between the Mature stage and Decline stage results on return on assets. Tobin’s Q is relatively lower for Decline stage firms as stated above. This can be interpreted as that even though the market still expects the Decline stage firms to grow, the expectation is less than for Mature and Growth stage firms. This aligns with the Pecking Order theory that firms in growing stages tend to make relatively fewer profits than firms in later stages.

When looking at the capital structure variables, total debt, long-term and short-term, it can be concluded that the total debt and long-term debt ratio follow an increasing amount. Total debt has a mean (st. deviation) value of 0.51 (0.33), 0.51 (0.20), and 0.56 (0.19) for Growth, Mature, and Decline stage, while long-term debt follows this pattern with 0.15 (0.16), 0.21 (0.16), and 0.27 (0.16). However, for short-term debt, this value decreases from 0.36 (0.26), 0.29 (0.15), and 0.28 (0.14) for the Growth, Mature, and Decline stage, respectively. It appears that when moving through corporate life cycle stages, firms tend to move from short-term to long-term debt while slightly increasing their total debt value. The pecking order theory partly confirms this for the stages. The table also shows a significant difference between the control variables during different stages of the corporate life cycle. The control variables show that the mean (st. deviation) value of Risk during the Growth stage is relatively high with 0.16 (0.10) compared to Mature with 0.04 (0.06) and Decline stage 0.02 (0.05) firms. Tangibility during the Growth stage has a mean (st. deviation) value of 0.05 (0.06) which is relatively low compared to both the Mature with 0.19 (0.19) and the Decline stage with 0.28 (0.19). Growth in sales is relatively high during the Growth stage with a mean (st. deviation) value of 8.37 (45.71) and lowers during Mature stage with

0.07 (0.43) and even more during the decline stage with 0.04 (0.40). Growth in assets during the Growth stage is negative -6.00 (3.49) and positive during Mature 0.05 (0.42) and even higher during the Decline stage 0.23 (0.21). Size pattern is from relatively low during the Growth stage 9.31(2.34), to higher during the Mature stage 12.13 (2.13) and relatively highest in the Decline stage 13.62 (2.40). This suggests that firms in the Growth stage are relatively smaller than Mature and Decline stage firms.

Variables	Growth stage		Mature Stage		Decline Stage		Anova test on mean difference (F test and p value)
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	
Return on Equity NI	-0.29	7.49	-0.05	5.04	0.08	0.19	0.44
Return on Assets EBIT	-0.29	0.58	0.051	0.13	0.062	0.06	178.80***
Tobin's Q	4.92	3.31	4.92	1.99	4.44	1.92	15.34***
Total debt	0.51	0.33	0.51	0.20	0.56	0.19	15.58***
Long-term debt	0.15	0.16	0.21	0.16	0.27	0.16	50.16***
Short-term debt	0.36	0.26	0.29	0.15	0.28	0.14	8.21***
Risk	0.16	0.10	0.04	0.06	0.02	0.05	196.52***
Tangibility	0.05	0.06	0.19	0.19	0.28	0.19	94.04***
Growth in sales	8.37	45.71	0.07	0.43	0.04	0.40	36.014***
Growth in assets	-6.00	3.49	0.05	0.42	0.23	0.21	2517.02***
Size	9.31	2.34	12.13	2.13	13.62	2.40	185.19***
# of observations	61		1239		915		
% of total observations	2.8%		55.9%		41.3%		

*Table 6 ANOVA test on mean difference: This table includes descriptives of each variable during different life cycle stages after winsorizing at the 1% level and after the natural log of the size variable *** mean difference significant at the 0.01 level, ** mean difference significant at the 0.01 level, ** mean difference significant at 0.05 level * mean difference significant at 0.1 level.*

5.4. Correlation Matrix

The next section includes the discussion of Pearson's correlation matrix, which is shown in Table 7. What can be seen from the firm performance measures, being return on equity, return on assets, and Tobin's Q is that they correlate significantly and positively with each other expect for return on equity with Tobin's Q which is positive but not significant. This suggests that a higher return on equity also results in a higher return on assets (and a higher return on assets results in a higher Tobin's Q). This is in line with the findings of Tian and Zeitun (2007).

Next to the performance measures, the corporate life cycle variable total debt significantly correlates with both the other capital structure variables being long-term debt (r= 0.679**) and short-term debt (r= 0627**) at the 0.01 level or better. Concluding, this means that the three independent variables measure the capital structure. Adding to this, long-term debt is significant and negatively correlated with short-term debt with r=-0.146** at the 0.01 level. That suggests that when a firm increases its short-term debt, its long-term debt ratio decrease, and when long-term debt increases, short-term debt decreases. These findings are confirmed by Ahsan et al. (2016).

When comparing the performance measures with the capital structure variables, most of the findings are significant negatively correlated with each other. For example, total debt is correlates significant and negative with return on assets (Tobins'Q) with r=-0.87** (r=-0.999). This suggests that when debt increases, firm performance decreases, which is in line with the findings of Tian and Zeitun (2007) and Umar et al. (2012).

When comparing the dummy variables to the performance variables, the Growth dummy has no significant effect on ROE or Tobins'Q. The Growth stage has, however a significant and negative effect on return on assets (r=-0371**). This suggests that firms in the Growth stage have a relative lower return on assets compared to Mature and Decline stage firms. The Mature does not have a significant correlation with ROE or ROA. However, the Mature stage dummy has a positive significant effect on Tobin's Q (r=0.111**). This suggests that firms in the Mature stage have a relative high market to book value. The Decline dummy has no significant relation with ROE but has a significant positive correlation with ROA (r=0.088**). Decline stage firms also have a significant negative relation with Tobin's Q (r=-00.117**). This appears to be in line with the theories, which suggests that Declining firms have a relative lower market to book ratio.

Comparing the capital structure variables with the dummy variables shows that total debt is not significantly related to the Growth stage. Total debt is however negative and significant related to the Mature dummy (r=-0111**). This finding is in line with the Pecking Order theory that Mature firms make less use of external financing. Decline stage firms dummy is positively and significantly related for total debt (r=0118**). This is also in line with the Pecking Order theory, which states that declining firms need more external funding since, compared to the Mature stage firms, their internal financing is too low. Results for long term debt are as follows. Long-term debt tends to have a significant negative correlation with Growth stage firms(r=-0.092**). This suggest that firms in the Growth stage issue relatively lower long-term debt than other firms. This is in line with the theory which suggest that Growth stage firms do not make use of long-term external financing. Long-term debt has a negative significant relation with Mature firms (r=-0.166**). This finding in line with the Pecking Order theory that Mature firms make less use of external financing but rely more in internal financing. Decline stage firms tend to issue relatively more long-term debt (r=0.198**). This suggests that firms in the Decline stage issue relatively more long-term debt. Short-term debt, the final capital structure measure is positive and significant related to the Growth stage dummy. This suggests that Growth stage firms, when issuing debt, issue relatively more short-term debt (r=0.076**). Short-term debt has no significant correlation with the Mature dummy and a negative (r=-0.051**) significant relation with the Decline dummy.

Concluding from this, Growth stage firms tend to issue relatively lower amounts of long-term debt, but higher amounts of short-term debt. This is in line with the theory which states that the future of Growth stage firms is relatively uncertain, which makes it harder for Growth stage firms to issue long-term debt. Mature stage firms issue relatively less debt which is in line with the Pecking order theory which states that Mature stage firms rely more on external than internal financing. Finally, Decline stage firms rely on external debt again (as can be seen from the positive significant results with total and long-term debt) and issue relative more debt.

When checking for the control variables and the firm performance variables, tangibility is negatively related to return on equity (r=-0.060**) and Tobins'Q (r=-0.20**). Furthermore, tangibility has a significant an positive relation with return on assets (r=0.068**). Concluding from this it is shown that when a firm is more tangible, the firm is more profitable in relation to its assets, but less efficient (ROE) and its market to book value also decreases. For the variable risk, both return on equity (r=-0.057**) and return on assets (r=-0.312**) have a negative relationship. This means that overall, when a firm takes more risks, firm performance is relatively lower. Growth in sales is only positively related to Tobins'Q (r=0.042*) suggesting that an increase in sales has a positive effect on the market to book ratio. Growth in assets has a positive significant relation to both return on assets (r=0.457**) and Tobins'Q (r=0.096**). This means that overall firms who increase asset growth have a higher performance. Regarding size, it seems that return on assets is positive (r=0.186**) and Tobin's Q is negative (r=-0.284**). This means that firms that are relatively larger face an increase in return on assets, but a decrease in market to book value.

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Return on Equity NI	1												
2	Return on Assets EBIT	0.120**	1											
3	Tobin's Q	0.030	0.087**	1										
4	Total debt	-0,030	-0.087**	-0.999**	1									
5	Long-term debt	0,003	-0.019	-0.679**	0.679**	1								
6	Short-term debt	-0.043*	-0.097**	-0.627**	0.628**	-0.145**	1							
7	Growth Dummy	-0.012	-0.371**	0.017	-0.017	-0.092**	0.076**	1						
8	Mature Dummy	-0.013	0.035	0.111**	-0.111**	-0.166**	0.026	-0.190**	1					
9	Decline Dummy	0.017	0.088**	-0.117**	0.118**	0.198**	-0.051*	-0.141**	-0.945**	1				
10	Tangibility	-0.060**	0.068**	-0.210**	0.210**	0.444**	-0.187**	-0.145**	-0.207**	0.257**	1			
11	Risk	-0.057**	-0.312**	0.018	-0.020	-0.143**	0.125**	0.342**	0.116**	-0.230**	-0.169**	1		
12	Growth in sales	0.002	0.013	0.043*	-0.044*	-0.012	-0.046*	0.178**	-0.031	-0.027	0.011	0.037	1	
13	Growth in assets	0.035	0.457**	0.096**	-0.096**	0.043*	-0.175**	-0.830**	0.086**	0.189**	0.137**	-0.422**	-0.004	1
14	Size	0.020	0.186**	-0.284**	0.284**	0.261**	0.106**	-0.232**	-0.250**	0.329**	0.114**	-0.331**	-0.009	0.294**

*Table 7 Correlation matrix where: ** is correlation significant at 0.01 level and ** is correlation significant at 0.05 level.*

5.5. Ordinary Least Square Regression

This part of the research shows and explains the Ordinary least square regression analyses. Part of this section also discusses the hypotheses from chapter 2.6. In tables 9 and 10, the results of the regression are shown. The first regression, table 9 shows whether the corporate life cycle influences capital structure, measured by total debt, long-term debt (appendix B1), and short-term debt (appendix B2), controls for the first hypothesis. This regression also includes the industry dummies as control variable. Table 9 the regression between capital structure and firm performance, which tests the second hypothesis. Lastly, Table 10-12 shows whether the capital structure influences firm performance during different stages of the corporate life cycle, which tests the final hypothesis 3. The regressions include all control variables being Risk (RK), Tangibility (TAN), and Size (SZ) and industry dummies.

5.5.1. Corporate Life Cycle Influences Leverage

The first hypothesis predicts whether and how capital structure acts under different stages in the corporate life cycle. According to the hypothesis, firms in the Growth and Decline stage have relatively higher leverage compared to Mature firms. The table includes three models all regressed on the total debt ratio, where model 1 includes only control variables (baseline model), model 2 includes the Growth life cycle dummy variable and model 3 includes the Decline life cycle dummy variable. Benchmark for the models is the Mature stage dummy. The results in table 9 show that (model 2) Growth life cycle, in contrast of what was hypothesized, a negative and significant result (b=-0.368*** and t=0.056) compared to the Mature stage. This suggests that firms during the Growth stage issue less total debt than during the Mature stage. Model 3 shows that compared to the Mature life cycle stage, Decline stage firms do not significantly differ when it comes to issuing total debt (b=0.012 and t=0.009). Even though these findings seem to reject the hypothesis, where it was stated that Growth and Decline firms have relatively higher leverage compared to the Mature stage (in fact, Growth has a significant negative result, which means that moving from Growth to Mature stage leverage increases by 36%), this is in line with other findings where for example Faff et all. (2016) found that debt increases when Growth companies change to Mature stage due to higher debt servicing ability. Adding to this they found that when a firm moves from the Mature to the Decline stage, companies issue less debt. For this, no evidence is found in this study. Adding to this, partly in line with this research, Ahsan et al. (2016) found evidence for relatively lower debt during the Growth and Decline stage and higher debt during the Mature stage. Concluding from these findings, Growth stage firms have relatively lower debt ratios compared to the Mature stage, whereas Decline stage has no statistically significant difference compared to the Mature stage when controlling for debt ratio. In the appendix, as a robustness check, regressions on long-term debt and short-term debt are executed. The findings are in line with the total debt ratio supporting the rejection of the hypothesis and confirming the findings.

5.5.2. Control variable findings corporate life cycle influences leverage

Controlling for the R2 values of all the models, it is shown that model 1 and model 3 is 16.9% and for model 2 its 19.3% (model including Growth stage dummy).

Furthermore, Tangibility is positive and significant for all the models. This suggests that when a firm is more tangible, it increases its total debt ratio. Risk seems to have no significant effect on leverage ratio for either of the models. Sales growth is slightly negative and significant (b=-0.001 t=0.001) for models 1 and 3 which suggests that when sales growth increases, total debt slightly decreases. Similar findings are found for growth in assets which is negative and significant for all models. This means that when a firm grows in assets it tends to decrease its debt value. Size is positive and significant for all models meaning that when size of firms increases, debt ratio also increases.

Similar findings are found when looking at the robustness check results (replacing total debt with long-term debt and short-term debt). There appears to be no significant differences for long-term debt expect for Risk which becomes negative and significant at the 0.1 level for all models. This suggests that firms who increase their risk, decrease their long-term debt value. When controlling for short-term debt, it shows that tangibility becomes negative for all three models, which means that when a firm is more tangible, short term debt decreases. Furthermore, it shows that risk is positive and significant for all three models. When a firm has relatively higher risk, short term debt increases.

5.5.2 Robustness checks using different dependent capital structure variables

As stated earlier in this study, next to total debt ratio, other capital structure variables are used in this research, being long-term debt and short-term debt (results shown in appendix B). As can be seen in both table 12 and table 13, only the growth life cycle stage (model 2) has a negative significant result on the capital structure variables long-term debt and short-term debt respectively (where for table 12 b= -0.162*** and t= 0.034: where for table 13 b=-0.206*** and t=0.035). These results are similar as the results shown in table 8 where the influence on the growth life cycle is also negative and significant. This suggests that for all three capital structure measures, a Growth stage firms relatively have lower debt levels than compared to the Mature stage.

Results for the Decline stage are also similar for both long-term debt and short-term debt compared to total debt. Decline stage has an insignificant different effect on the long-term debt and short-term debt (table 12 b= 0.006 and t=0.007: table 13 b=0.006 and t=0.007). Concluding from this, it shows that Decline stage firms do not have statistical different debt ratios compared to Mature stage firms.

These results are in line with the main findings of the main study, suggesting that life cycle stages have similar impact on capital structure measures total debt, long-term debt and short-term debt.

	Total debt ratio		
Variables	1	2	3
Intercept	0.128***	0.138***	0.133***
	(0.026)	(0.026)	(0.026)
Growth life cycle stage		**-0.368*****	
		(0.045)	
Decline life cycle stage			**0.012**
			(.009)
Tangibility	0.234***	0.217***	0.231***
	(0.022)	(0.021)	(0.022)
Risk	0.085	0.072	0.091
	(0.075)	(0.074)	(0.075)
Sales Growth	-0.001**	0.000	-0.001**
	(0.001)	(0.001)	(0.001)
Asset Growth	-0.035***	-0.077***	-0.035***
	(0.004)	(0.006)	(0.004)
Size	0.029***	0.029***	0.028***
	(0.002)	(0.002)	(0.002)
Industry Dummy	Included	Included	Included
N	2215	2215	2215
Adjusted R2	0.169	0.193	0.169

*Table 8 Influence of corporate life cycle stage on capital structure. The model used is LEV=B0+B1lifecycle+B2Z..The benchmark used in this regression is the Mature stage firm. The Models in the regression are comparisons to the Mature stage. Model one shows the baseline model on the results of control variables on the capital structure measure. The second model shows the growth life cycle measure influence on capital structure and model three shows the Decline life cycle measure influence on capital structure. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.01 level.*

5.5.3 Capital Structure has an Influence on firm performance

To be able to test for the second hypothesis, first it must be investigated if and how capital structure has an influence op firm performance. To control for this, model 2 in the regressions of table 9, 10 and 11 are used. In the regression of table 9 it is shown that total debt has no statistically significant effect on the first firm performance measure return on equity (NI) (b= -0.271 and t=0.456). In table 10 however, it can be concluded that total debt does have a statistically significant negative effect on return on assets (EBIT) being the second firm performance measure (b=-52.628*** and t=15.445). this suggests that when total debt increases, return on assets significantly decreases. The same accounts for Tobin's Q where total debt also has a significant negative effect on the third performance measure (b=-9.998*** and t=0.008). These findings for table 10 and 11 are contradicting to hypothesis 1 where it is stated that capital structure has a positive influence on firm performance. Even though they are contradicting to the hypothesis in this study, they are in line with findings from other studies. For example, Tian and Zeitun (2007) found a negative relationship between capital structure and firm performance in their research on Jordanian firms. Furthermore, Umar et al. (2012) and Vatavu (2015) found a negative relationship between capital structure and firm performance in both Pakistan and Romanian. Also, Lin and Chang (2009) found that when a firm has a certain amount of debt, it increases firm value, but when a firm has more debt than that specific level, the relationship becomes negative. This is in line with the trade-off theory, which suggests that firms search for a balance between interest tax shields and incremental costs in debt financing.

5.5.4 The Influence of the Corporate Life Cycle on the Relationship between Capital Structure and Company Performance

To be able to test for the second hypothesis models five and six in the tables 9, 10 and 11 are used. The second hypothesis hypothesizes whether the corporate life cycle during the Growth and Decline stage have a statistically significant stronger effect on the relationship between capital structure than during the Mature stage. First, as shown in table 9 models two, three and four, total debt, Growth stage and Decline stage have no statistically significant effect on the firm performance indicator being return on equity. However, when looking at model five, the combination of Growth and total debt is positive and significant at the 10% level (b=2.556* and t=0.064). This finding suggests, that when a Growth life cycle firm issues more total debt, relative to Mature stage firms, the firm is relatively worse at converting its equity financing into profits. Regarding the Decline stage, there seems to be no significant difference between the Decline life cycle stage and the Mature life cycle stage (b=0.312 t=0.324).

When controlling for the second firm performance measure, being return on assets (table 10), the following results are found. Total debt (model 2) is negative and significant at the 1% level (b=-0.053*** and t=0.456) suggesting that, when a firm issue more total debt efficiency decreases significantly. Corporate life cycle stages Growth and Decline (models three and four respectively) have no statistical effect on return on assets. When checking for the total debt measure on return on assets during the different life cycle stages, it is shown that when a Growth life cycle stage issues more total debt, the firm becomes less efficient (b=0.080* t=0.046) compared to Mature stage firm since the effect of issuing more total debt is stronger during this stage. In contrast, Decline stage firms tend to be more efficient compared to Mature stage firms when issuing more total debt (b=-0.020* and t=0.011) since the effect is weakened. Regarding the hypothesis where it was stated that both Growth and Decline stage firms strengthen the effect of capital structure on firm performance Growth stage firms are more inefficient in contrast to the hypothesis whereas Decline stage firms are more efficient when issuing more total debt.

For the final firm performance measure, being Tobin's Q (table 11) model two show that total debt has a negative and significant effect on Tobin's Q (b=-9.998*** and t=0.008). This suggests that overall, when firms issue more total debt the market to book value becomes lower, suggesting that the market expects these firms to decline, since expected future earnings are taken into account in the current market price. The third model shows the relation between Growth stage firm and Tobin's Q which is positive and significant (b=3.670*** and t=0.450), which means that during the Growth stage the market expects the firms to grow. Decline stage firms (model four) are negative but not significant. When controlling for the effect of Growth stage on total debt, it shows that when a firm issues more total debt, the expected growth result is weakened in contrast of firms not issuing more total debt (b=3.347*** and t=0.636). This suggests that when a firm during the Growth stage issues more debt, they are expected to less decrease in expected growth in comparison to Mature life cycle stage. Regarding Decline stage firms, the results is the same where issuing more debt the expected growth effect (b=-2.079*** and t=0.145) also tends to less decrease. Concluding from this, the expected strengthening of the capital structure on firm performance effect is rejected as results show a weakening effect of the negative total debt on Tobin's Q relation.

Some studies found a negative relationship between Capital structure and firm performance. For example, Tian and Zeitun (2015), Umar (2012), Stephen (2012), and Vatavu (2015) found that when a firm increases debt, firm performance becomes negative. This is not in line with any of the three treated theories. However, Lin and Chang (2009) found that when a firm has a certain amount of debt, it increases firm value, but when a firm has more debt than that specific level, the relationship becomes hostile again. This is in line with the trade-off theory, which suggests that firms search for a balance between interest tax shields and incremental costs in debt financing. Finally, Ebaid (2009) found no relationship between capital structure and firm performance.

5.5.5 Robustness checks using different capital structure variables

To investigate whether the effects on firm performance are similar when using other capital structure measure, two robustness checks have been executed. In the first regression, total debt is replaced by long-term debt, and in the second regression total debt is replaced by short-term debt. Both regressions are shown in the appendix (tables 14-16 and 17-19 respectively). Results overall seem similar to the main study results (where total debt is used).

First of all, model one table 14 and 17 show the effect of capital structure (long-term debt and short-term debt respectively). on the firm performance measure return on equity (NI). Results show that long-term debt in line with total debt has no significant effect on return on equity. However, short-term debt has a negative significant result (b=-1.299*** and t=0.596) which suggests that when short-term debt is increased, overall return on equity declines.

Also in line with the main study is the effect of Growth*long-term debt (model four table 14 and 17), which is significant at the 0.1 level. For Growth*short-term debt, no significant result is found on return on equity. Finally, Decline*long-term debt and Decline*short-term (model five table 14 and 17) debt follow the same results as the main study which is not significant.

Regarding the influence on the second performance measure, being return on assets it shows that there are a few differences compared to the main study are found.

Long-term debt follows the same findings as total debt, being negative and significant whereas short-term debt is insignificant.

Where Growth*total-debt is positive and significant and strengthen the effect, Growth*long-term debts appears to be negative and significant and weakens the efficiency effect. Growth*short-term debt follows the Growth*total-debt pattern, which is positive and significant.

Decline*long-term debt follows the main findings and is negative and significant. Decline* short-term debt, however, is negative but not significant.

For the final firm performance measure, being Tobin's Q, all results are like the main findings. All results are negative and significant at the 0.01 level.

Return on Equity (NI)						
Variables	1	2	3	4	5	6
Intercept	0.738 (0.556)	0.773 (0.559)	0.708 (0.557)	0.806 (0.561)	0.713 (0.556)	0.844 (0.567)
Total debt ratio		**-0.271** **(0.456)**				
Growth stage dummy			**1.119** **(0.978)**			
Decline stage dummy				**0.185** **(0.197)**		
Growth * Total debt					**2.556*** **(0.064)**	
Decline * Total debt						**0.312** **(0.324)**
Tangibility	-1.491*** (0.465)	-1.428*** (0.477)	-1.438*** (0.467)	-1.542*** (0.468)	-1.460*** (-0.072)	-1.563*** (0.471)
Risk	-3.658** (1.605)	-3.635** (1.606)	-3.618** (1.606)	-3.567* (1.608)	-3.684** (-0.056)	-3.517** (1.612)
Sales Growth	0.003 (0.011)	0.003 (0.011)	-0.001 (0.012)	0.003 (0.011)	0.001 (0.002)	.003 (0.011)
Asset Growth	0.064 (0.078)	0.055 (0.080)	0.191 (0.136)	0.060 (0.078)	0.228* (0.070)	0.066 (0.078)
Size	0.003 (0.038)	0.010 (0.040)	0.002 (0.038)	-0.006 (0.039)	0.003 (0.002)	-0.008 (0.039)
Industry Dummy	Included	Included	Included	Included	Included	Included
N	2215	2215	2215	2215	2215	2215
Adjusted R2	0.010	0.006	0.007	0.007	0.012	0.011

*Table 9 Regression analysis Return on equity (NI). This table shows the regression of the influence of the capital structure measure total debt on the firm performance measure Return on equity (NI). The model used is PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z. Model one shows the baseline model on the results of control variables on the performance measure. The second model shows the influence of the capital structure measure on firm performance. Models three and four show the corporate life cycle effect on firm performance. Models five and six show whether the corporate life cycle measures strengthen or weaken the effect of capital structure on firm performance. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.1 level.*

	Return on assets (EBIT)					
Variables	1	2	3	4	5	6
Intercept	0.031* (0.019)	0.038 (0.019)	0.031 (0.019)	0.029 (0.019)	0.031 (0.019)	0.024 (0.019)
Total debt ratio		**-0.053*** (0.015)**				
Growth stage dummy			**0.015 (0.033)**			
Decline stage dummy				**-0.007 (0.007)**		
Growth * Total debt					**0.080* (0.046)**	
Decline * Total debt						**-0.020* (0.011)**
Tangibility	-0.0036 (0.016)	0.0087 (0.016)	-0.003 (0.016)	-0.002 (0.016)	-0.0026 (0.016)	0.0011 (0.016)
Risk	-0.37*** (0.055)	-0.36*** (0.054)	-0.365*** (0.055)	-0.369*** (0.055)	-0.37*** (0.054)	-0.37*** (0.055)
Sales Growth	0.00041*** (0.0004)	0.00034 (0.0004)	0.00034 (0.0004)	0.00039 (0.0004)	0.000341 (0.00038)	0.00039 (0.000373)
Asset Growth	0.049 (0.0027)	0.048*** (0.0027)	0.051*** (0.005)	0.050*** (0.003)	0.055*** (0.0040)	0.049*** (0.0027)
Size	0.0018 (0.0013)	0.0033* (0.0013)	0.002 (0.001)	0.002 (0.001)	0.0018 (0.0013)	0.0025* (0.0013)
Industry Dummy	Included	Included	Included	Included	Included	Included
N	2215	2215	2215	2215	2215	2215
Adjusted R2	0.226	0.233	0.229	0.007	0.226	0.230

*Table 10 Regression analysis return on assets (EBIT). This table shows the regression of the influence of capital structure measure total debt on the firm performance measure return on assets (EBIT). The model used is PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z. Model one shows the baseline model on the results of control variables on the performance measure. The second model shows the influence of the capital structure measure on firm performance. Models three and four show the corporate life cycle effect on firm performance. Models five and six show whether the corporate life cycle measures strengthen or weaken the effect of capital structure on firm performance. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.1 level.*

	Tobin's Q					
Variables	1	2	3	4	5	6
Intercept	8.737*** (0.260)	10.019*** (0.010)	8.639 (0.256)	8.693*** (0.262)	8.771*** (0.258)	8.030*** (0.253)
Total debt ratio		**-9.998*** (0.008)**				
Growth stage dummy			**3.670*** (0.45)**			
Decline stage dummy				**-0.119 (0.092)**		
Growth * Total debt					**-3.437*** (0.636)**	
Decline * Total debt						**-2.079*** (0.145)**
Tangibility	-2.346*** (0.217)	-0.003 (0.009)	-2.172*** (0.215)	-2.313*** (0.219)	-2.389*** (0.216)	-1.867*** (0.210)
Risk	-0.912 (0.750)	-0.065* (0.029)	-0.782 (0.739)	-0.971*** (0.751)	-0.878 (0.745)	-1.851** (0.720)
Sales Growth	0.013** (0.005)	0.000 (0.000)	-0.001 (0.005)	0.012** (0.005)	0.015** (0.005)	0.010* (0.005)
Asset Growth	0.350*** (0.037)	-0.001 (0.001)	0.766*** (0.062)	0.353*** (0.037)	0.130** (0.055)	0.338*** (0.035)
Size	-0.288*** (0.018)	-0.001 (0.001)	-0.290*** (0.017)	-0.283*** (0.018)	-0.289*** (0.017)	-0.216*** (0.018)
Industry Dummy	Included	Included	Included	Included	Included	Included
N	2215	2215	2215	2215	2215	2215
Adjusted R2	0.172	0.999	0.196	0.173	0.180	0.240

*Table 11 Regression analysis Tobin's Q. This table shows the regression of the influence of capital structure measure total debt on the firm performance measure Tobin's Q. The model used is PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z. Model one shows the baseline model on the results of control variables on the performance measure. The second model shows the influence of the capital structure measure on firm performance. Models three and four show the corporate life cycle effect on firm performance. Models five and six show whether the corporate life cycle measures strengthen or weaken the effect of capital structure on firm performance. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.1 level.*

6. Conclusion

6.1 Findings

Goal of this study is to investigate whether the corporate life cycle stages have a statistically significant effect on the influence of capital structure on firm performance. This is done on German listed companies from 2012-2018. This research is done this way, since the influence of capital structure on firm performance is researched multiple times, but not whether there exists a difference during different corporate life cycle stages. The research question of this study is as follows:
'Do corporate life cycle stages effect the influence of capital structure on firm Performance on German listed firms in the period of 2012-2018?'. This research question consists of two hypotheses which are tested in chapter 5.

In hypothesis one it is questioned whether the corporate life cycle stages have any statistical difference on capital structure ratios. As already discussed in chapter 5, the hypothesis is rejected since the life cycle Growth stage is statistically negative compared to the Mature life cycle stage. This means in contrast to what is hypothesized, Growth life cycle stages have relatively lower debt levels than Mature stage firms. Decline stage firms do not have a statistically different capital structure level. Also, this is in contrast on the hypothesis, which stated that the Decline stage firms also have relatively higher debt levels than Mature stage firms. These results are similar for the capital structure measures long-term debt and short-term debt. Concluding from this, hypothesis one is rejected where it is stated that both Growth and Decline stage firms have a relatively higher capital structure ratio compared to the Mature stage. Even though these results are not in line with the expected results, there are some studies which found (partially) similar results to this study. For example, Faff et all. (2016) found that debt increases when Growth companies change to Mature stage due to higher debt servicing ability. Adding to this they found that when a firm moves from the Mature to the Decline stage, companies issue less debt. For this, no evidence is found in this study. Adding to this, partly in line with this research, Ahsan et al. (2016) found evidence for relatively lower debt during the Growth and Decline stage and higher debt during the Mature stage.

In the second part of the research, hypothesis two is tested, where it is tested whether the corporate life cycle stage has an influence on the effect of capitals structure on firm performance. Firstly, it is tested whether and how capital structure influences firm performance. Results for this part of the study shows that capital structure has, mostly a negative and significant influence on firm performance. This is in line with earlier stated studies. For example, Tian and Zeitun (2015), Umar (2012), Stephen (2012), and Vatavu (2015) found that when a firm increases debt, firm performance becomes negative. This is not in line with any of the three treated theories. However, Lin and Chang (2009) found that when a firm has a certain amount of debt, it increases firm value, but when a firm has more debt than that specific level, the relationship becomes hostile again. This is in line with the trade-off theory, which suggests that firms search for a balance between interest tax shields and incremental costs in debt financing. Furthermore, it is tested whether the Growth and Decline life cycle stage strengthen the effect of the negative significant influence on firm performance. As shown in the results on tables 9, 10 and 11, the overall influence of Growth and Decline stage firms on capital structure on firm performance weakens most of the negative significant results. Also, these findings are not in line with hypothesis two where it was stated that the results during the Growth and Decline stage would be stronger compared to the Mature stage. Therefore, the second hypothesis is rejected.

Overall, the findings of this study are not in line with the predicted results where the pecking order theory results (high-low-high) pattern was expected. In fact, the opposite theory, the trade-off theory is (partly) supported during this study. Furthermore, it was expected that higher leverage ratios would be positive for firm performance. For this sample it was shown that a negative influence was found. Finally, it was expected that during the Growth and Decline stage, the effect of capital structure on firm performance would be stronger due to the expected capital structure ratios. For this, also no evidence was found in this study.

6.2 Research Limitations and Recommendations

This paper aimed to investigate the influence of capital structure on firm performance for German public listed firms. All analyses run under the fixed regression model gave evidence for rejecting assumptions of the pecking order theory. The proof presented proves that capital structure has a definite negative influence on a company's performance, which confirms none of the treated theories. These results are in alignment with Faff et all. (2016) and Ahsan et al. (2016).

6.2.1 Limitations

The reliability of this research was limited to two main areas. The first limitation was that the data was only used for the publicly listed companies. The second limitation was that the data had to be adjusted at some points to eliminate outliers. Each of these limitations have been explained in detail below to get an understanding on how they impacted the study.

The first limitation is that the data used was only for publicly listed companies. This information may not be conclusively true for private companies in the German market. The management of public companies is not the same as private companies and this distinction might result in different capital structures for private firms. This data would then be inconclusive for German firms.

Adjusting the data to eliminate outliers might have created a problem. Information used might be biased since all the companies that did not have adequate data were eliminated. Also, those that had negative long-term debt when compared to the rest of the companies were also eliminated. This information therefore implies that there is a possibility that the data used in the calculations was one-sided. Also, the results for the regression calculations have implied that the leverage variables are dependent upon the classification for a particular industry. This means that when a given industry is placed under a different classification, the results might be different.

6.2.2 Recommendations

Having seen the limitations of the study, it would be important to try and perform the same research on other companies in different countries to determine if the corporate life cycle is the same. The information obtained from the findings of research from other countries would help shed lighter on the corporate life cycle. It would also be important to incorporate data from private companies into the study. These private companies have added information that cannot be ignored. The information would be beneficial in determining if firm performance is equivalent in both public and private companies of the same age. The differences can also be analyzed if there be any.

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Appendix

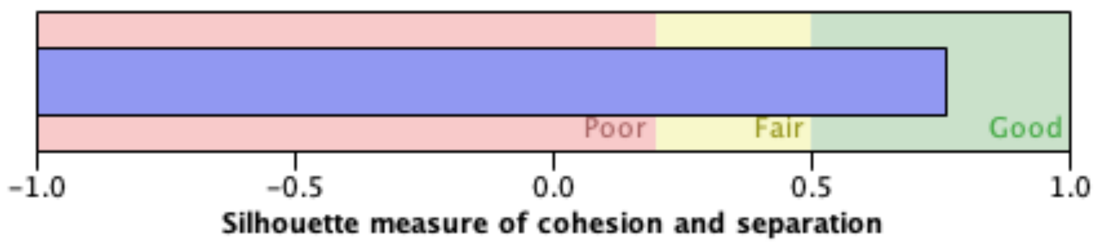
A. Results cluster analysis

This part contains the robustness checks of the research.

Model Summary

Algorithm	TwoStep
Inputs	3
Clusters	3

Cluster Quality



B. Results robustness checks corporate life cycle on capital structure

	Long-term debt ratio		
Variables	1	2	3
Intercept	-0.028	-0.023	-0.026
	(0.019)	(0.019)	(0.020)
Growth life cycle stage		**-0.162*** **	
		(0.034)	
Decline life cycle stage			**0.006**
			(0.007)
Tangibility	0.336***	0.329***	0.335***
	(0.016)	(0.016)	(0.016)
Risk	-0.098*	-.104*	-0.096*
	(0.056)	(0.056)	(0.056)
Sales Growth	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Asset Growth	-0.013***	-0.031***	-0.013***
	(0.003)	(0.005)	(0.003)
Size	0.015***	0.015***	0.014***
	(0.001)	(0.001)	(0.001)
Industry Dummy	Included	Included	Included
N	2215	2215	2215
Adjusted R2	0.250	0.257	0.253

*Table 12: Influence of corporate life cycle stage on capital structure. The model used is LEV=B0+B1lifecycle+B2Z..The benchmark used in this regression is the Mature stage firm. The Models in the regression are comparisons to the Mature stage. Model one shows the baseline model on the results of control variables on the capital structure measure. The second model shows the growth life cycle measure influence on capital structure and model three shows the Decline life cycle measure influence on capital structure. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.01 level.*

Short-term debt ratio			
Variables	1	2	3
Intercept	0.156***	0.161***	0.158***
	(0.020)	(0.020)	(0.020)
Growth life cycle stage		**-0.206*****	
		(0.035)	
Decline life cycle stage			**0.006**
			(0.007)
Tangibility	-0.102***	-0.112***	-0.104***
	(0.017)	(0.017)	(0.017)
Risk	0.183***	0.176***	0.186***
	(0.057)	(0.057)	(0.057)
Sales Growth	-0.001**	.000	-0.001**
	(0.000)	(0.000)	(0.000)
Asset Growth	-.022***	-.045***	-.022***
	(0.003)	(0.005)	(0.003)
Size	.014***	.014***	.014***
	(0.001)	(0.001)	(0.001)
Industry Dummy	Included	Included	Included
N	2215	2215	2215
Adjusted R2	0.118	0.131	0.118

*Table 13: Influence of corporate life cycle stage on capital structure. The model used is LEV=B0+B1lifecycle+B2Z..The benchmark used in this regression is the Mature stage firm. The Models in the regression are comparisons to the Mature stage. Model one shows the baseline model on the results of control variables on the capital structure measure. The second model shows the growth life cycle measure influence on capital structure and model three shows the Decline life cycle measure influence on capital structure. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.01 level.*

C. Results robustness checks The Influence of the Corporate Life Cycle on the Relationship between Capital Structure and Company Performance

	Return on Equity (NI)				
Variables	1	2	3	4	5
Intercept	0.762	0.708	0.806	0.614	0.857
	(0.556)	(0.557)	(0.185)	(0.558)	(0.564)
Long-term debt ratio	**0.873**				
	(0.610)				
Growth stage dummy		**1.119**			
		(0.978)			
Decline stage dummy			**0.185**		
			(0.197)		
Growth * Long-term debt				**7.263***	
				(2.916)	
Decline * Long-term debt					**0.733**
					(0.575)
Tangibility	-1.785***	-1.438***	-1.542***	-1.428***	-1.654***
	(0.508)	(0.467)	(0.468)	(0.465)	(0.482)
Risk	-3.572*	-3.618*	-3.567*	-3.450*	-3.448*
	(1.606)	(1.606)	(1.608)	(1.606)	(1.614)
Sales Growth	0.003	-0.001	0.003	-0.002	0.003
	(0.011)	(0.012)	(0.011)	(0.011)	(0.011)
Asset Growth	0.075	0.191	0.060	0.184**	0.069
	(0.079)	(0.136)	(0.078)	(0.092)	(0.078)
Size	-0.010	0.002	-0.006	0.009	-0.008
	(0.039)	(0.038)	(0.039)	(0.038)	(0.039)
Industry Dummy	Included	Included	Included	Included	Included
N	2215	2215	2215	2215	2215
Adjusted R2	0.011	0.007	0.007	0.012	0.011

*Table 14: Regression analysis firm performance. This table shows the regression of the influence of the capital structure measure long-term debt on the firm performance measure return on equity (NI). The model used is PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z. Model one shows the influence of the capital structure measure on the firm performance measure. The second, and third model show the influence of the corporate life cycle on the performance measure. The fourth and fifth, models whether the corporate life cycle Growth/Decline stage strengthen or weaken the effect of capital structure on firm performance. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.01 level.*

			Return on Assets (EBIT)		
Variables	1	2	3	4	5
Intercept	0.029	0.031	0.029	0.039**	0.023
	(0.018)	(0.019)	(0.019)	(0.019)	(0.019)
Long-term debt ratio	**-0.072*** **				
	(0.021)				
Growth stage dummy		**0.015**			
		(0.033)			
Decline stage dummy			**-0.007**		
			(0.007)		
Growth * Long-term debt				**-0.43*** **	
				(0.099)	
Decline * Long-term debt					**-0.048** **
					(0.020)
Tangibility	0.021	-0.003	-0.002	-0.0073	0.0071
	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)
Risk	-0.37***	-0.37***	-0.369***	-0.38***	-0.38***
	(0.054)	(0.055)	(0,055)	(0.054)	(0.055)
Sales Growth	0.0004	0.0003	0.0004	0.0007*	0.0004
	(0.00037)	(0.00039)	(0.0004)	(0.00038)	(0.00037)
Asset Growth	0.049***	0.051***	0.050***	0.042***	0.049***
	(0.0027)	(0.005)	(0.003)	(0.0031)	(0.0027)
Size	0.0029**	0.002	0.002	0.0015	0.0026*
	(0.0013)	(0.001)	(0.001)	(0.0013)	(0.0013)
Industry Dummy	Included	Included	Included	Included	Included
N	2215	2215	2215	2215	2215
Adjusted R2	0.233	0.225	0.226	0.235	0.231

*Table 15: Regression analysis firm performance. This table shows the regression of the influence of the capital structure measure long-term debt on the firm performance measure return on assets (EBIT). The model used is PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z. Model one shows the influence of the capital structure measure on the firm performance measure. The second, and third model show the influence of the corporate life cycle on the performance measure. The fourth and fifth models show whether the corporate life cycle Growth/Decline stage strengthen or weaken the effect of capital structure on firm performance. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.01 level.*

	Tobin's Q				
Variables	1	2	3	4	5
Intercept	8.495***	8.639***	8.693***	8.861***	8.192***
	(0.197)	(0.256)	(0.262)	(0.259)	(0.254)
Long-term debt ratio	**-8.725*** **				
	(0.216)				
Growth stage dummy		**3.670*** **			
		(0.450)			
Decline stage dummy			**-0.119**		
			(0.092)		
Growth * Long-term debt				**-7.246*** **	
				(1.356)	
Decline * Long-term debt					**-3.360*** **
					(0.259)
Tangibility	0.589***	-2.172***	-2.313***	-2.409***	-1.602***
	(0.180)	(0.215)	(0.092)	(0.216)	(0.217)
Risk	-1.771***	-0.782	-0.971	-1.120	-1.874**
	(0.569)	(0.739)	(0.751)	(0.746)	(0.727)
Sales Growth	0.010**	-0.001	0.012**	0.017***	0.011**
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Asset Growth	0.236***	0.766***	0.353***	0.231***	0.330***
	(0.028)	(0.062)	(0.037)	(0.018)	(0.035)
Size	-0.160***	-0.290***	-0.283***	-0.295***	-0.238***
	(0.014)	(0.017)	(0.018)	(0.018)	(0.017)
Industry Dummy	Included	Included	Included	Included	Included
N	2215	2215	2215	2215	2215
Adjusted R2	0.522	0.193	0.170	0.180	0.228

*Table 16: Regression analysis firm performance. This table shows the regression of the influence of the capital structure measure long-term debt on the firm performance measure Tobin's Q. The model used is PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z. Model one shows the influence of the capital structure measure on the firm performance measure. The second, and third model show the influence of the corporate life cycle on the performance measure. The fourth and fifth models show whether the corporate life cycle Growth/Decline stage strengthen or weaken the effect of capital structure on firm performance. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.01 level.*

	Return on Equity (NI)				
Variables	1	2	3	4	5
Intercept	0.941*	0.708	0.806	0.752	0.781
	(0.563)	(0.557)	(0.185)	(0.556)	(0.565)
Short-term debt ratio	**-1.299****				
	(0.596)				
Growth stage dummy		**1.119**			
		(0.978)			
Decline stage dummy			**0.185**		
			(0.197)		
Growth * Short-term debt				**1.885**	
				(1.922)	
Decline * Short-term debt					**0.242**
					(0.670)
Tangibility	-1.624***	-1.438***	-1.542***	-1.484***	-1.493***
	(0.468)	(0.467)	(0.468)	(0.465)	(0.465)
Risk	-3.420**	-3.618*	-3.567*	-3.731**	-3.618**
	(0.034)	(1.606)	(1.608)	(1.607)	(1.608)
Sales Growth	0.002	-0.001	0.003	0.003	0.003
	(0.011)	(0.012)	(0.011)	(0.011)	(0,011)
Asset Growth	0.035	0.191	0.060	0.154	0.064
	(0.079)	(0.136)	(0.078)	(0.120)	(0.078
Size	0.021	0.002	-0.006	0.001	-0.002
	(0.038)	(0.038)	(0.039)	(0.038)	(0.039)
Industry Dummy	Included	Included	Included	Included	Included
N	2215	2215	2215	2215	2215
Adjusted R2	0.012	0.007	0.007	0.011	0.006

*Table 17: Regression analysis firm performance. This table shows the regression of the influence of the capital structure measure short-term debt on the firm performance measure return on equity (NI). The model used is PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z. Model one shows the influence of the capital structure measure on the firm performance measure. The second, and third model show the influence of the corporate life cycle on the performance measure. The fourth and fifth, models show whether the corporate life cycle Growth/Decline stage strengthen or weaken the effect of capital structure on firm performance. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.01 level.*

	Return on Assets (EBIT)				
Variables	1	2	3	4	5
Intercept	0.035*	0.031	0.029	0.034*	0.029
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Short-term debt ratio	**-0.021**				
	(0.020)				
Growth stage dummy		**0.015**			
		(0.033)			
Decline stage dummy			**-0.007**		
			(0.007)		
Growth * Short-term debt				**0.34*** **	
				(0.065)	
Decline * Short-term debt					**-0.015**
					(0.019)
Tangibility	-0.0058	-0.003	-0.002	-0.0023	-0.0035
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Risk	-0.36***	-0.37***	-0.369***	-0.38***	-0.37***
	(0.054)	(0.055)	(0,055)	(0.054)	(0.055)
Sales Growth	0.00039	0.0003	0.0004	0.00035	0.00040
	(0.00037)	(0.00039)	(0.0004)	(0.00037)	(0.00037)
Asset Growth	0.049***	0.051***	0.050***	0.066***	0.049***
	(0.0027)	(0.005)	(0.003)	(0.0041)	(0.0027)
Size	0.0021	0.002	0.002	0.0016	0.0021
	(0.0013)	(0.001)	(0.001)	(0.0013)	(0.0013)
Industry Dummy	Included	Included	Included	Included	Included
N	2215	2215	2215	2215	2215
Adjusted R2	0.226	0.225	0.226	0.235	0.226

*Table 18: Regression analysis firm performance. This table shows the regression of the influence of the capital structure measure short-term debt on the firm performance measure return on assets (EBIT). The model used is PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z. Model one shows the influence of the capital structure measure on the firm performance measure. The second, and third model show the influence of the corporate life cycle on the performance measure. The fourth and fifth, models show whether the corporate life cycle Growth/Decline stage strengthen or weaken the effect of capital structure on firm performance. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.01 level.*

	Tobin's Q				
Variables	1	2	3	4	5
Intercept	10.104***	8.639***	8.693***	8.711***	8.185***
	(0.196)	(0.256)	(0.262)	(0.259)	(0.256)
Short-term debt ratio	**-8.765*** **				
	(0.207)				
Growth stage dummy		**3.670*** **			
		(0.450)			
Decline stage dummy			**-0.119**		
			(0.092)		
Growth * Short-term debt				**-3.627*** **	
				(0.895)	
Decline * Short-term debt					**-3.097*** **
					(0.256)
Tangibility	-3.241***	-2.172***	-2.313***	-2.359***	-2.318***
	(0.163)	(0.215)	(0.092)	(0.216)	(0.210)
Risk	0.693	-0.782	-0.971	-0.772	-1.425**
	(0.559)	(0.739)	(0.751)	(0.748)	(0.728)
Sales Growth	0.004	-0.001	0.012**	0.013**	0.011**
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Asset Growth	0.157***	0.766***	0.353***	0.177**	0.351***
	(0.028)	(0.062)	(0.037)	(0.056)	(0.035)
Size	-0.165***	-0.290***	-0.283***	-0.286***	-0.228***
	(0,013)	(0.017)	(0.018)	(0.018)	(0.018)
Industry Dummy	Included	Included	Included	Included	Included
N	2215	2215	2215	2215	2215
Adjusted R2	0.542	0.193	0.170	0.178	0.220

*Table 19: Regression analysis firm performance. This table shows the regression of the influence of the capital structure measure short-term debt on the firm performance measure Tobin's Q. The model used is PERF=B0+B1Lev+B2lifecycle+B3lev*lifecycle+B4Z. Model one shows the influence of the capital structure measure on the firm performance measure. The second, and third model show the influence of the corporate life cycle on the performance measure. The fourth and fifth, models show whether the corporate life cycle Growth/Decline stage strengthen or weaken the effect of capital structure on firm performance. Note that ***= significant at 0.01 level, ** = significant at the 0.05 level and *= significant ate the 0.01 level.*