Master thesis

Firm-specific determinants of capital structure: Evidence on UK listed and unlisted firms

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Abstract

This study investigates to what extent firm-specific determinants of capital structure help to explain the degree of leverage used in firms in the United Kingdom. Data is acquired from the ORBIS-database based on a random sample. The final sample includes 12169 listed and unlisted firms in the UK firms covering the years 2014-2018. Based on the pecking-order-, trade-off- and agency theory several hypotheses are formed regarding the firm-specific determinants used, which are tested through ordinary-least-squares regression. The results show that based on the empirical model a moderate amount of variation in leverage is explained, with profitability, tangibility and liquidity being the most important firm-specific determinants of capital structure for firms in the United Kingdom. Practically significant results are also found for firm size, non-debt tax shields, risk, stock listing and age, although these are of less importance than profitability, tangibility and liquidity. No practically significant and consistent evidence is found for growth and tax shields. Overall, it appears that the pecking-order theory explains the most amount of variation in leverage.

Keywords: *capital structure, United Kingdom, listed firms, unlisted firms, pecking-order theory, agency theory, trade-off theory, ordinary-least-squares regression*

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1. Introduction

1.1 Background

Over the past decades, researchers have attempted to find the optimal capital structure. In short, a firm's capital structure is based on the amount of equity and debt it uses to finance its operations. Despite a variety of theoretical approaches, none of the researchers found a universally accepted and practical solution (Al-Najjar & Hussainey, 2011; Psillaki & Daskalakis, 2009). According to Myers (2001), there is not 'one' theory which can describe the choices of firms regarding their capital structure, and we should not expect one either. However, there are several underlying theories which attempt to explain capital structures, in which this research tests the main capital structure theories like the pecking order theory, the trade-off theory, and the agency theory.

In short, the pecking order theory is based on information asymmetries between the firm and external parties and considers three different forms of funding, namely retained earnings, debt, and equity. As a result of the costs of these information asymmetries, the theory suggests that firms prefer retained earnings over debt, and debt over equity (Myers, 1984, 2001; Myers & Majluf, 1984). From a static-trade-off perspective, "firms set a target debt-ratio and move towards it" (de Jong, Kabir, & Nguyen, 2008, p. 1960). This target debt-ratio is considered to be an optimal balance, hence called trade-off, between the tax benefits of debt and the costs of financial distress (Myers, 1984). Alternatively, the agency theory states that agency costs arise due to the separation of ownership and control, as managers might not necessarily act in the best interests' of the shareholders (Jensen, 1986; Jensen & Meckling, 1976). One possible way to resolve this issue is by issuing debt as it serves as an obligation of future payouts (Jensen, 1986).

As mentioned, there have been a large amount of studies regarding firm's capital structures over the past decades, covering a variety of countries around the world. Moreover, some countries were considered more often than others, with countries such as the United States and the United Kingdom as the most studied ones. As a result, later studies often shifted their interest to other countries in continents like Europe and Asia. Therefore, recent studies focusing solely on the UK are scarce, as to my knowledge the most recent study regarding the UK dates back to 2012 (Abdou, Kuzmic, Pointon, & Lister, 2012). Although a study from 2012 may appear to be recent, the authors use a dataset covering the years 2000 till 2006. In their results, Abdou et al. (2012) find evidence supporting the pecking-order theory, as it according to their model explains about 60% of leverage determination. Nonetheless, Abdou et al. (2012) only studies firms in the retail sector in the UK, therefore it only provides a limited view on capital structures of UK firms across all industries.

Similarly, Al-Najjar and Hussainey (2011) also study UK firms, though they are using even older data covering the period from 1991 to 2002. In their results, they do not find consistent evidence supporting one theory or the other, though they find most evidence for the trade-off theory. Brav (2009) studies public as well as private firms in the UK, using a sample of firm data ranging from 1993 to 2003. In contrast to the other studies, Brav (2009) does not explicitly link his findings to the theories mentioned, though he does find that private firms rely more on debt, while public firms use more equity. Besides these three examples, there are several other similar studies on firm-specific determinants of capital structure on UK firms, though they are even less recent than the examples mentioned.

In the literature, the evidence with regard to whether a firms' financing decisions are best explained by firm- or country-specific determinants is inconclusive. For instance, Psillaki and Daskalakis (2009) find "that firm-specific rather than country facts explain differences in capital structures choices" (p. 319). Similarly, Gungoraydinoglu and Öztekin (2011) find that firm-specific determinants explain two-thirds of the variation in capital structure decisions, while country-specific determinants only explain the remaining one-third, stressing the importance of firm-specific determinants. In addition, Kayo and Kimura (2011) find that firm-level determinants together with time-level explains 78 percent of the variation in leverage, while finding low support for the importance of country-level factors. Further, Al-Najjar and Hussainey (2011) find that firm-specific determinants are the main drivers of corporate leverage in the UK. Alternatively, Jõeveer (2013) finds contradicting as well as supporting evidence. He finds that country-specific factors are more important for smaller unlisted firms, while he finds that firm-specific determinants explain the most variation with regard to listed and large unlisted firms. Other studies have found that the impact of country-specific factors does not only influence the degree of leverage used directly, but they also influence firm-specific determinants indirectly, thus leading to an indirect effect of country-specific factors on leverage (Acedo-Ramírez & Ruiz-Cabestre, 2014; de Jong et al., 2008). Another possible factor that explains capital structure decisions are the industry-specific determinants. Li and Islam (2019) find that "industry-specific factors can both directly and indirectly affect a firm's capital structure choice" (p. 435). Degryse, de Goeij, and Kappert (2012) find similar results for small firms, stating that there are differences between and within industries. However, Degryse et al. (2012) and Li and Islam (2019) do not solely study industry-specific differences, but also firm-specific determinants.

1.2 Relevance and research question

After reviewing a vast amount of recent literature on capital structure determinants, it could not have gone unnoticed that recent work has mainly focused on studying differences across countries (e.g. Acedo-Ramírez & Ruiz-Cabestre, 2014; de Jong, Kabir, & Nguyen, 2008; Mc Namara, Murro, & O'Donohoe, 2017; Moradi & Paulet, 2019), while earlier work was more focused on a single country (e.g. Bennett & Donnelly, 1993; Frank & Goyal, 2003; Titman & Wessels, 1988). This notion was confirmed by Li and Islam (2019), who found a similar gap in the literature. This transition from single-country to cross-country studies has also lowered the interest in studying firm-specific determinants, as these studies focus more on country-specific determinants. However, the majority of papers aforementioned stress the importance of firm-specific determinants, which therefore will be the main focus of this study.

Overall, it can easily be concluded that there is evidence on capital structures in UK firms available, though none makes use of recent data. Therefore, this study contributes by using a large and very recent dataset of the time period 2014 till 2018, in comparison to the other studies on the United Kingdom mentioned before (Abdou et al., 2012; Al-Najjar & Hussainey, 2011; Brav, 2009). Despite using recent data, it does not necessarily mean that very different results are being found compared to earlier work. Therefore, this study uses the traditional framework of most-used firm-specific determinants and their expected relationships with leverage, in line with most earlier work such as Abdou et al. (2012), Al-Najjar and Hussainey (2011), Dasilas and Papasyriopoulos (2015) and Degryse et al. (2012). However, although most studies use similar determinants and find similar directions in the relationships, they do not often agree on which determinant explains the highest degree of leverage. For instance, Al-Najjar and Hussainey (2011) find that firm size, growth rate, profitability, tangibility and risk are the main firm-specific determinants. On the contrary, Abdou et al. (2012) find that profitability and non-debt tax shields are the most important ones. Therefore, this study also attempts to contribute by including a relatively large amount of firm-specific determinants in the model, in order to find the most important one(s).

From a practical point of view, the results of this study could help managers to understand which factors explain their firm's capital structure and how their optimal degree of leverage is determined based on more recent evidence. Based on the discussion above, the following research question has been formulated:

To what extent do the firm-specific determinants of capital structure explain the degree of leverage used in UK firms?

In the end, these determinants will be linked back to the capital structure theories mentioned. Although there might not be a single theory that entirely explains capital structure decisions, it will be interesting to establish which one fits best.

1.3 Structure

The remainder of this paper is structured as follows. Chapter 2 discusses the relevant capital structure theories, followed by a summary of the most important firm-specific determinants. Next to that, an extensive discussion follows on how certain hypotheses are developed. Besides the aforementioned, some attention will be given to other influences on the capital structure of UK firms. Chapter 3 describes the research methods, consisting of an explanation of different methods used in previous research, a selection of the most appropriate method, followed by the empirical model, an explanation of how the variables are measured, how the hypotheses are being tested, and finally, a description of the data used. Chapter 4 presents all the results found in this study based on descriptive statistics, correlations, assumptions, regressions and robustness checks. Finally, chapter 5 concludes by summarizing the main results, looking at the limitations of this study, as well as addressing avenues for future research.

2. Literature review

This chapter considers all the relevant literature around a firm's capital structure. It is organized as follows. First, section 2.1 introduces the relevant capital structure theories such as the trade-off theory, pecking-order theory and agency theory, as well as some alternative theories. Thereafter, an overview of the relevant firm-specific determinants follows in section 2.2. In addition, section 2.3 discusses several other influences on capital structure such as institutional settings and corporate governance factors. Following on the determinants as stated in section 2.2, section 2.4 extensively discusses each firm-specific determinant resulting in a hypothesis of the expected effect on leverage. Finally, besides the formulation of hypotheses, section 2.4 also discusses the relevant control variables used in this study.

2.1 Capital structure theories

Capital structure theory dates back to the late '50s when Modigliani and Miller (1958) proposed that in perfect and frictionless markets a firms' value is indifferent of its financing structure. The 'perfect market' is a simplification of practice in which the following assumptions are made: no transaction costs, no taxes and no information asymmetries (Chen, 2004; Heyman, Deloof, & Ooghe, 2008). Modigliani and Miller's (1958) paper acquired a lot of interest from researchers and initiated a stream of capital structure research since. Subsequent literature emphasized on incorporating these imperfections in these 'perfect markets' to better be able to explain capital structure decisions.

2.1.1 Trade-off theory

Derived from the work of Modigliani & Miller (1958), Myers (1984) has introduced the static tradeoff theory. This theory implies that there is a balance between the value (i.e. benefit) of interest tax shields and the costs of financial distress. Because interest expenses are tax-deductible, using more debt or at least paying higher interest expenses leads to higher interest tax shields. Therefore, firms are expected to use as much debt as possible. However, under the assumption of holding a firm's assets constant, it may become more difficult to invest in positive net present value projects when firms face large debt obligations. Moreover, it may become more difficult to issue or acquire debt when the firm is already highly leveraged. These constraints are called the cost of financial distress. To be specific, the cost of financial distress include: "the legal and administrative costs of bankruptcy, as well as the subtler agency, moral hazard, monitoring and contracting costs which can erode firm value even if formal default is avoided." (Myers, 1984, p. 580). For example, customers may be more

reluctant to work with the firms due to uncertainties regarding future support of their products. Similarly, suppliers may be more hesitant to delivers services or products on credit when the firm's future continuity is uncertain (Chen, Lensink, & Sterken, 1999; Jensen & Meckling, 1976). Therefore, despite not going into formal default, firms may still feel the costs of financial distress.

2.1.2 Pecking-order theory

As described by Myers (1984) and Myers and Majluf (1984), the pecking order theory predicts that firms prefer to use internal financing over external financing. Within external financing, firms prefer to issue the safest security first (Myers, 1984). Therefore, they start with debt, then proceed to issue hybrid securities like convertible debt, and as a last resort, they issue equity (Myers & Majluf, 1984). Debt is considered to be the safest security, as with equity more inside information is revealed to the outside (Myers, 1984). More importantly, the pecking order theory is based on the concept of asymmetric information, meaning that managers have more information than investors. To compensate for these informational asymmetries investors demand higher risk premiums. Therefore, external financing is more expensive than internal financing due to the additional risk ran by investors. However, in general, debt is covered by collateral in case of default, while equity most often is not. As a result, the risk premium demanded for equity is higher than for debt. Furthermore, by issuing shares, the firm loses part of its ownership which is not preferred. Hence, from the perspective of the firm, debt is often seen as the cheaper and safer form of external financing.

Besides, when a firm issues equity or debt, it unintentionally sends certain signals to stakeholders. For instance, a firm is expected to issue equity when the firm is overvalued. From a rational investors' perspective, it goes against their best interests to issue when the firm is undervalued. Therefore, an equity issue announcement is considered to be 'bad news' from the investors' perspective (Myers & Majluf, 1984).

2.1.3 Agency theory

Another theory that attempts to explain financing choices is the agency theory described by Jensen & Meckling (1976). The theory proposes that managers (agents) do not necessarily act in the best interests of the shareholders (principal). These conflicts arise due to the separation of ownership and control. Shareholders can reduce agency conflicts by investing in monitoring and bonding activities like compensation schemes, which may help to better align the interests of managers towards the shareholders' interests. In addition, other methods may include auditing, introducing budget caps and implementing formal control systems (Jensen & Meckling, 1976). However, despite attempting to reduce the deviations between the interests of both parties, they cannot be zeroed out according

to the authors. What is left, is what Jensen & Meckling (1976) call the residual loss. Moreover, they define agency costs as the sum of the monitoring and bonding expenditures plus the residual loss.

Building on the agency theory, Jensen (1986) described the agency costs of free cash flow, also known as the free cash flow theory, which is often also considered as part of the agency theory. According to Jensen (1986): "Free cash flow is cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital." (p. 323), based on this, one can easily spot the agency conflict of what to do with the free cash flows. Managers on one hand, are motivated to let the firm grow by investing it, possibly beyond its optimal size, to increase their power as they have more resources under their control (overinvestment problem). In addition, managers are also incentivized to let the firm grow, as they are often rewarded with higher compensations. Shareholders on the other hand, are more interested in payouts, in the form of receiving dividends. Jensen (1986) states that shareholders struggle to motivate managers to pay out free cash flows, rather than investing it in suboptimal projects or investments. To lower these agency costs of free cash flow, debt can be issued which lowers the amount of cash at hand (without retention of the issue) to spend by management, as they are obliged to pay out future cash flows to the debtholders. Moreover, this obligation creates a strong signal for future payouts. Therefore, issuing debt may be an effective substitute for paying out dividends (Jensen, 1986).

2.1.4 Alternative theories

Besides the aforementioned theories, other theories regarding capital structure exist, though these are not as well known or proven as the pecking-order, trade-off and agency theories. In addition, some theories are often considered to be part of a larger theory, while others describe it as a theory on its own. In this study for instance, the signaling theory is considered to be part of the pecking-order theory as seen in section 2.1.2. Also, as described earlier in section 2.1.3, the free cash flow theory is considered as a part of the agency theory.

Alternatively, the market timing theory proposes that managers look at current market conditions within debt- as well as equity markets. If additional capital is needed, they issue on the respective market which looks most favorable at that point in time (Gaud, Hoesli, & Bender, 2007). For instance, a firm would issue shares in an overvalued market, while shares would be repurchased in an undervalued market (De Bie & De Haan, 2007). Frank and Goyal, (2009) find that the market timing theory does not directly explain the patterns they observe, implying that the applicability of the market timing theory is questionable. Furthermore, according to Degryse et al. (2012), the market timing theory is not relevant for unlisted firms as they are mainly privately held and therefore

do not have access to public markets. However, the theory might be relevant for listed firms. But, due to the inclusion of unlisted firms in this study, the market timing theory will not be tested as it is not applicable to unlisted firms.

2.2 Firm-specific determinants of capital structure

In the literature, the list of firm-specific determinants studied is quite long. However, there are only a few determinants that are established as the most important factors. These include profitability, firm size, tangibility, and market-to-book ratio which is a proxy for growth opportunities (Li & Islam, 2019). Other factors that are widely tested but not limited to are: growth (not to be confused with growth opportunities)(Dasilas & Papasyriopoulos, 2015; Iqbal & Kume, 2014; Matias & Serrasqueiro, 2017; Moradi & Paulet, 2019), tax- and non-debt tax shields (Acedo-Ramírez & Ruiz-Cabestre, 2014; Degryse et al., 2012; Frank & Goyal, 2009; Moradi & Paulet, 2019), earnings volatility (proxy for risk)(Iqbal & Kume, 2014; Moradi & Paulet, 2019; Psillaki & Daskalakis, 2009), stock listing (Brav, 2009; Dasilas & Papasyriopoulos, 2015; Demirgüç-Kunt, Martinez Peria, & Tressel, 2020; Jõeveer, 2013a, 2013b), age (Dasilas & Papasyriopoulos, 2015; Matias & Serrasqueiro, 2017; Mc Namara et al., 2017), and liquidity (Acedo-Ramírez & Ruiz-Cabestre, 2014; Degryse et al., 2012; Serghiescu & Văidean, 2014). This study will test the effect of profitability, firm size, tangibility, growth, tax- and non-debt tax shields, risk, stock listing and liquidity on leverage. Additionally, several control variables will be used, though they are not the main focus of this study.

2.3 Other influences on capital structure

2.3.1 Institutional settings

Although not tested, it is important to recognize that there also may be other influences affecting a firm's capital structure. For instance, there are certain differences between firms in different institutional settings (Acedo-Ramírez & Ruiz-Cabestre, 2014; Iqbal & Kume, 2014). Namely, the United Kingdom is considered to be a market-oriented country, whereas other countries like Germany and France are bank-oriented countries. The difference between the two is that firms in bank-oriented countries are more likely to acquire funds through bank financing, while firms in market-oriented are expected to prefer using the market by issuing debt or equity. To be specific, according to Acedo-Ramírez and Ruiz-Cabestre (2014) there are less informational asymmetries in bank-oriented countries, due to banks demanding collateral as a security for the loan, as well as having a more close relationship with the firm. In turn also lowering the agency costs between borrowers and lenders, as well as the costs of financial distress. On the contrary, firms in market-

oriented countries tend to have a more dispersed ownership resulting in higher transparency, though at the cost of being more difficult to monitor resulting in higher agency costs (Acedo-Ramírez & Ruiz-Cabestre, 2014). Other institutional settings that potentially affect a firm capital structure include but are definitely not limited to: GDP growth, stock- and bond market development (de Jong et al., 2008; Kayo & Kimura, 2011).

2.3.2 Corporate governance

Besides these country factors, there are also corporate governance factors influencing capital structures. For example, Al-Najjar and Hussainey (2011) find that board size, insider ownership and outside directorship (also known as board independence) have an influence on capital structures of listed firms in the UK. Dasilas and Papasyriopoulos (2015) also find that board size has a negative impact on capital structure. Also, Sun, Ding, Guo, and Li (2016) find that firms in the UK with high managerial share ownership (MSO) concentration have lower leverage levels than firms with high institutional ownership. Moreover, Dasilas and Papasyriopoulos (2015) find a positive effect on leverage when a firm is audited by a Big 4 auditing company, implying that firms can achieve higher leverage levels more easily, as the quality of an audit by a Big 4 company is perceived to be higher. Loderer and Waelchli (2010) state that in firms where the CEO is also the chairman of the board (COB), also known as CEO duality, more agency issues arise. Not surprisingly, this is the result of the fact that the COB has the responsibility to monitor the CEO's actions and decisions. Perhaps not directly linked to the degree of leverage used, board compensation is also an important factor in corporate governance. By using variable compensation, directors are more inclined into the performance of the company, lowering agency costs, as less monitoring is needed by shareholders (Loderer & Waelchli, 2010).

2.3.3 Conclusion

As mentioned earlier in section 2.3.1, the influences discussed above are not tested in this study for multiple reasons. First, this study considers only firms that are registered in the United Kingdom. Therefore, including the impact of country factors would not be meaningful, as all firms in the sample face a similar influence of these country factors. Second, corporate governance factors are not included due to limitations in the data as a result of using data from unlisted firms as well. Although, listed firms are obliged to disclose certain information about their governance in their annual reports, unlisted firms are not. To cite Loderer and Waelchli (2010): "The results indicate that listed firms disclose more information. Unlisted firms are very reluctant to reveal much of anything" (p. 54). Therefore, corporate governance factors are not considered any further in this study.

2.4 Hypotheses development

2.4.1 Profitability

From a trade-off perspective, firms that are more profitable face less issues with regard to the payment of their creditors, thus lowering the probability of financial distress (Dasilas & Papasyriopoulos, 2015; Frank & Goyal, 2009; Hang, Geyer-Klingeberg, Rathgeber, & Stöckl, 2018; Kayo & Kimura, 2011). As a result of being more profitable, the tax advantages of debt can be fully used, whereas firms that are less profitable may potentially not. This may motivate profitable firms to use more debt, thus based on the trade-off theory, a positive relationship between profitability and leverage is expected. Similarly, the agency theory also predicts a positive relationship, as more profitable firms are expected to face more free cash flow issues. As a result, debt is used to discipline managers (Dasilas & Papasyriopoulos, 2015; Degryse et al., 2012; Frank & Goyal, 2009). Alternatively, profitable firms are better able to retain their earnings, thus they are expected to be having more cash at hand. From a pecking-order perspective, retained earnings is always the first choice to finance new investments (Dasilas & Papasyriopoulos, 2015; Degryse et al., 2012; Frank & Goyal, 2009; Hang et al., 2018; Kayo & Kimura, 2011). By being more profitable, firms are less dependent on the use of debt. Therefore, the pecking-order theory predicts a negative relationship between profitability and leverage.

With regard to the empirical evidence, most studies find similar results (Degryse et al., 2012; Frank & Goyal, 2009; Hang et al., 2018; Jõeveer, 2013a; Kayo & Kimura, 2011; Li & Islam, 2019; Matias & Serrasqueiro, 2017; Mc Namara et al., 2017; Moradi & Paulet, 2019). They find that profitability has a negative relationship with leverage, thus confirming the pecking-order perspective with regard to profitability. In general, these results hold, even when looking at long- and short-term debt (Kayo & Kimura, 2011; Matias & Serrasqueiro, 2017; Mc Namara et al., 2017). However, Degryse et al. (2012) does not find significant evidence that confirms the negative relationship with regard to long-term debt. On the other hand, Dasilas and Papasyriopoulos (2015) who study both listed and unlisted firms in Greece, find positive significant relationships for short-term, long-term and total debt ratios. However, the positive relationships in this case are caused by country-specific regulations in Greece, as they are obliged to distribute a certain percentage of their profits to their shareholders, therefore the use of debt is more appealing. Overall, most studies relate profitability to the pecking order theory and therefore I expect the following relationship:

Hypothesis 1: Profitability has a negative effect on leverage

2.4.2 Firm size

When relating firm size to the theories, several implications can be made. From a trade-off perspective, larger firms are considered to be better diversified than smaller firms (Frank & Goyal, 2009), which makes them less vulnerable to cyclical fluctuations in cashflows (Chen et al., 1999), i.e. larger firms are expected to have more stable cashflows (de Jong et al., 2008). In turn, lowering the risk of default, therefore, they are able to be higher leveraged and maintain those levels of leverage (de Haan & Hinloopen, 2003; Serghiescu & Văidean, 2014). Thus, size is often assumed as the inverse proxy for the probability of bankruptcy (Rajan & Zingales, 1995), i.e. larger firms are less likely to go bankrupt or feel the costs of financial distress (de Jong et al., 2008).

With regard to the pecking-order perspective, there are multiple explanations for why larger firms should be higher leveraged. Frank and Goyal (2009) and de Haan and Hinloopen (2003) find that large firms are higher leveraged, because they are often better known than small companies as well as being around longer. Therefore, larger firms should face lower problems when attempting to acquire or issue debt. In addition, similar to Frank and Goyal (2009), Chen et al. (1999) state that larger firms have lower information asymmetries because the public is more aware of a firm's situation, hence making it easier to acquire debt. Wald (1999) and Kayo and Kimura (2011) reason that larger firms are higher leveraged because they face lower transaction costs with (long-term) debt issues, therefore it being cheaper to issue larger contracts and making it more appealing to issue debt instead of equity. Moreover, according to Moradi and Paulet (2019), larger firms receive higher credit ratings, have easier access to capital markets and can borrow at more favorable rates than small firms due to lower information asymmetries. Besides a longer financial history, de Jong and Röell (2006) state that larger firms have more analysts' coverage, leading to lower information asymmetries, thus reducing the cost of borrowing. More importantly, Frank and Goyal (2003) state that in general, smaller firms do not follow the pecking order theory. Indeed, they find a higher support for the pecking order theory in relation to large firms, while they reject the pecking order theory for smaller firms. They find that as firm size increases, the support for the pecking order theory increases with it as well.

When studying the effect of firm size in relation to the agency theory, the results are mixed. Bevan and Danbolt (2004) and Smith and Warner (1979) state that agency conflicts between shareholders and lenders are more severe with regard to smaller firms. To lower these conflicts, they reason that lenders may shorten the debt's maturity in order to reduce risk. Similarly, but from the opposite perspective, Frank and Goyal (2009) and Zhang and Li (2008) state that larger and older firms, assuming they have a good reputation, face lower debt-related agency costs. On the contrary, Jensen and Meckling (1976) find that the total agency costs rise as the firm gets larger. Specifically,

they state that as the firm becomes larger, so does the cost of monitoring as it gets more complex and expensive.

In general, most studies on capital structure find strong positive relationships between the size of a firm and their respective use of leverage (Bevan & Danbolt, 2004; Chen et al., 1999; de Haan & Hinloopen, 2003; De Jong, 2002; de Jong et al., 2008; Frank & Goyal, 2009; Kayo & Kimura, 2011; Moradi & Paulet, 2019; Serghiescu & Văidean, 2014). On the contrary, Ozkan (2001) finds limited support for the positive effect of size on leverage, while Wald (1999), Rajan and Zingales (1995), Booth, Aivazian, Demirguc-Kunt, and Maksimovic (2001) and Öztekin (2015) find different results depending on the country. In addition, Öztekin (2015) states that he only finds support for firm size in countries with relatively strong institutional settings. Therefore, this might be a good explanation of why the importance of firm size differs between countries. Based on the previous discussion, I predict the following relationship:

Hypothesis 2: Size has a positive effect on leverage

2.4.3 Tangibility

As a result of information asymmetries, banks demand besides higher returns also collateral to secure their loans (Chen et al., 1999; Degryse et al., 2012; Li & Islam, 2019). In particular, tangible assets are the most used and accepted form of collateral, and consists of assets such as property, plant, and equipment (PPE) (Frank & Goyal, 2009). Therefore, firms with low amounts of tangible assets face more difficulties when attempting to obtain debt financing (Booth et al., 2001). Hence, Chen et al. (1999) state that a firms' asset structure has a direct impact on its capital structure. Their results confirm the idea that tangibility has a positive relation with leverage.

With regard to the agency perspective, Frank and Goyal (2009) mention that tangible firms face fewer debt-related agency problems due to collateralization of assets, as these serve as a security for the lender, thus predicting a positive relationship between tangibility and leverage. In addition, Rajan and Zingales (1995) reason that tangible assets can easily be turned into cash (collateralized), thus reducing the agency costs of debt. Similarly, from a static trade-off perspective, de Jong et al. (2008) state that higher tangibility induces less risk for the lender, but also leads to lower direct costs of financial distress. They find a positive and significant effect of tangibility on leverage for most of the countries included in their sample, but also specific to the UK. On the contrary, Al-Najjar and Hussainey (2011) find a negative relationship within UK firms. This difference in results is surprising, as de Jong et al. (2008) uses a sample ranging from 1997 till 2001, and Al-Najjar and Hussainey (2011) use data from the period 1991 till 2002. However, these differences might be explained by the measurement of the dependent variable, as de Jong et al. (2008) only

includes long-term debt ratio, whereas Al-Najjar and Hussainey (2011) also includes several other measurements. Moreover, Dasilas and Papasyriopoulos (2015) find a positive significant relation for long-term debt, while they find a negative significant relationship on short-term debt, potentially explaining the difference. Overall, all three theories predict a positive relationship between tangibility and leverage, although the empirical evidence is less conclusive. However, this study will follow the majority of studies proposing a positive relationship. Thus, leading to the following hypothesis:

Hypothesis 3: Tangibility has a positive effect on leverage

2.4.4 Growth

Whereas the direction of the relationship for other firm-specific determinants on leverage is rather clear, it is certainly not the case with regard to growth. Despite being tested in many studies, mixed results are being found, as well as having several contradicting propositions. As mentioned, growth opportunities should not be confused with growth. To illustrate, growth focuses on the past, as it is often measured based on past results, whereas growth opportunities are often measured based on expectations (market values), thus focusing on the future. Therefore, there is a clear distinction between the two. However, according to Heyman et al. (2008), "it is assumed that firms that grew faster in the past also have greater opportunities for future growth" (p. 306). In addition, Degryse et al. (2012) states that growth opportunities in SME studies are often proxied by intangible assets and sales- or assets growth. Furthermore, Degryse et al. (2012) included both of the aforementioned measures in their study and found results that are in line with each other, which is also similar to Michaelas, Chittenden, and Poutziouris (1999). Hence, this study considers growth and growth opportunities as being similar.

From a trade-off perspective, growth results in higher costs of financial distress, thus predicting a negative relationship between growth and leverage (Frank & Goyal, 2009). While most studies do not explain this proposition, Ozkan (2001) states that "although growth opportunities are capital assets which add value to a firm, they cannot be collateralized and do not generate current income" (p. 180). Therefore, they are intangible and only hold value as long as the firm does not go bankrupt. As a result, firms with higher growth opportunities are expected to face higher costs of financial distress, implying that they are less levered. On the other hand, to realize their growth, firms have to make certain investments. As a result, their financing needs become larger (Hang et al., 2018). Moreover, under the assumption of holding profitability fixed (Frank & Goyal, 2009), firms are expected to run out of their retained earnings at some point, thus having to make a shift towards external financing (Dasilas & Papasyriopoulos, 2015). Based on the pecking order by Myers (1984),

firms should prefer the use of retained earnings first, then debt and as a last resort, the use of equity. Therefore, the pecking order theory predicts that high-growth firms are more likely to use debt than firms that experience lower growth (Abdou et al., 2012; Dasilas & Papasyriopoulos, 2015; Degryse et al., 2012).

From an agency perspective, a negative relationship is expected between growth and leverage. For instance, Kayo and Kimura (2011) predict a negative relationship and explain it as follows. They state that debt is used to discipline managers, and to mitigate their opportunistic behaviors. In the case of high free cash flows, opportunistic behavior becomes more apparent. Firms that have good growth opportunities, meaning they have plenty of positive net present value (NPV) investments, have lower free cash flows as these cash flows are being used to invest. Therefore, less debt is needed to discipline managers, implying a negative relationship. Similarly, but instead of aiming at manager-shareholder conflicts, there are also conflicts between shareholders and lenders, especially when the risk of default is high (Psillaki & Daskalakis, 2009). These conflicts arise from the issue of underinvestment and the asset-substitution problem (de Jong et al., 2008). For instance, in heavily leveraged firms a large amount of the cashflows go to lenders in the form of interest, leaving less cashflow available to invest in profitable projects, in turn resulting in lower growth. Besides, in these situations some shareholders are prepared to willingly turn down profitable projects to lower wealth extraction by lenders (Heyman et al., 2008). Asset substitution for instance is used by shareholders by selling low-risk projects (funded by lenders) and investing these funds again into high-risk projects, resulting in the additional risk being shifted towards lenders. To lower these conflicts in high-growth firms, equity is used instead of debt (de Jong et al., 2008), indicating a negative relationship. Similarly, due to these conflicts, firms with higher growth opportunities may be considered more risky by lenders, resulting in being more constrained in acquiring debt financing (Abdou et al., 2012).

As mentioned, the results found in the literature are mixed. Moradi and Paulet (2019), Dasilas and Papasyriopoulos (2015), and Fan, Titman, and Twite (2012) find a negative relationship between growth and leverage. In addition, Li and Islam (2019) also find a negative relationship when considering the market leverage of Australian firms (sign. at 1% level, while they find a positive relationship when accounting for book leverage (sign. at 5% level). Iqbal and Kume (2014) find a significant and positive relation in UK firms when using the market-to-book ratio, though they do not find a significant relationship when looking at past growth. On the contrary, Degryse et al. (2012) studies Dutch SMEs and finds a positive and significant relationship for assets growth with total- and long-term debt, while the effect of short-term debt is insignificant. More importantly, Acedo-Ramírez and Ruiz-Cabestre (2014) find a negative and significant (at 1% level) relationship for UK firms.

In general, the direction of the relationship between growth opportunities and leverage is not clear. Therefore, I include two hypotheses, one hypothesis for a negative relationship and an alternative hypothesis for a positive relationship.

Hypothesis 4: Growth has a negative effect on leverage

Hypothesis 4a: Growth has a positive effect on leverage

2.4.5 Tax- & non-debt tax shields

From a trade-off perspective, firms are incentivized to use debt due to the deductibility of interest payments from their tax bill (Abdou et al., 2012). In countries where tax rates are higher, firms are more inclined to use debt as it increases their tax shield and thus lowers the effective tax rate (Abdou et al., 2012; Acedo-Ramírez & Ruiz-Cabestre, 2014; Frank & Goyal, 2009). Therefore, the trade-off theory predicts a positive relationship. Although, this prediction appears to be logical, the empirical evidence is more ambiguous. Acedo-Ramírez and Ruiz-Cabestre (2014) find a positive relation for UK firms, confirming the prediction. However, Moradi and Paulet (2019), Degryse et al. (2012) and Frank and Goyal (2009) find a negative relationship. Interestingly, Degryse et al. (2012) find a negative and significant relation for total and long-term debt, while they find a positive and significant effect for short-term debt. Overall, I predict the following relationship:

Hypothesis 5: Tax shields have a positive effect on leverage

Alternatively, not only interest payments generate tax shields. While not being an expense, depreciation costs may also be used as a tax deduction. As a result, these may reduce the tax benefits of debt (Abdou et al., 2012). Therefore, depreciation costs may be a substitute to interest payments in generating tax shields (Degryse et al., 2012), implying a negative relationship between non-debt tax shields and the degree of leverage used (Acedo-Ramírez & Ruiz-Cabestre, 2014). Again, the empirical evidence is inconclusive about the direction of the relationship. Dasilas and Papasyriopoulos (2015) for instance, do not even formulate a hypothesis due to the mixed evidence found in literature, though they do test the relationship. In their results, they do not find any relationships between non-debt tax shields and leverage, even when accounting for total, long- and short-term debt. Similarly, Acedo-Ramírez and Ruiz-Cabestre (2014) and Degryse et al. (2012) do not find any significant relationship either. Moradi and Paulet (2019) and Frank and Goyal (2009) find contradicting evidence that there exists a positive relationship between the two. On the contrary, Ozkan (2001), who also studies firms in the UK, finds that non-debt tax shields are indeed negatively

related to leverage. Following the predictions and the evidence found by Ozkan (2001), I expect the following relationship:

Hypothesis 6: Non-debt tax shields have a negative effect on leverage

2.4.6 Risk

Firms with volatile cashflows are considered to be risky. Moradi and Paulet (2019) and Kayo and Kimura (2011) reason that a constant income stream is the most important determinant of whether a firm is able to meet its obligations to its lenders or not. Therefore, firms with more volatile cashflows have higher costs of financial distress, as due to their risky nature, they might be constrained in issuing debt or equity (Al-Najjar & Hussainey, 2011; Psillaki & Daskalakis, 2009). Moreover, volatile cashflows may lead to suboptimal usage of tax shields as these cannot be (fully) used when income streams decline (Frank & Goyal, 2009). Thus, from a trade-off perspective a negative relation is expected between earnings volatility (risk) and leverage. On the contrary, the agency theory predicts a positive relationship, as shareholders are reluctant to invest more equity in risky projects and would rather pass the risk to the lenders (Moradi & Paulet, 2019; Psillaki & Daskalakis, 2009). Besides, the expected return should be higher for shareholders due to the risk involved, even when considering that debt is often backed by collateral in case of default while equity is not. Therefore, from an agency perspective, risky firms are expected to borrow more.

In the literature, most studies find support for the trade-off theory, as they find negative relationships between earnings volatility and the degree of leverage used (Al-Najjar & Hussainey, 2011; de Jong et al., 2008; Frank & Goyal, 2009; Iqbal & Kume, 2014; Psillaki & Daskalakis, 2009). On the other hand, Moradi and Paulet (2019) and Michaelas, Chittenden and Poutziouris (1999) find a positive relationship, indicating support for the agency theory. Michaelas et al. (1999), who studies SME firms in the UK, reason that "agency costs are lower in more risky firms, due to lower underinvestment problems" (p. 121–122), resulting in the use of higher leverage. Though Michaelas et al. (1999) find a positive relationship for UK firms, we should not necessarily expect a positive relationship in this study, as Iqbal and Kume (2014) and Al-Najjar and Hussainey (2011) found a negative relationship, while they also specifically study UK firms. Overall, most studies expect and find a negative relationship between risk and leverage, an approach that this study will follow:

Hypothesis 7: Risk has a negative effect on leverage

2.4.7 Liquidity

Firms are considered to be liquid when they possess more short-term assets compared to their short-term liabilities. These short-term assets include accumulated cash (potentially the result of higher profitability), as well as other short-term assets like accounts receivable and inventory, which can be transformed into cash rather easily (Cole, 2013). From a pecking-order perspective, internal funds are being used first to pay for liabilities or to finance investments (Abdou et al., 2012; Cole, 2013; de Jong et al., 2008). Only if these are exhausted, firms will use issue debt or equity. Therefore, the pecking order theory predicts a negative relationship between liquidity and leverage. On the other hand, the trade-off theory proposes a positive relationship, as liquid firms have lower problems meeting their financial obligations, thus facing lower costs of financial distress and are therefore less restricted in the ability to acquire debt (Abdou et al., 2012; Cole, 2013; Degryse et al., 2012; Ozkan, 2001).

When comparing the empirical evidence, the results are quite similar. Abdou et al. (2012) and Ozkan (2001) both study firms in the UK, and both find a negative relationship supporting the pecking order theory. Cole (2013) studies unlisted firms in the US, and also finds a negative relationship, while Degryse et al. (2012) finds a positive relationship with regard to short-term and total- debt ratios for Dutch SMEs. However, this contradictory evidence may also be the result of a largely different measurement method that is employed by Degryse et al. (2012). Moreover, de Jong et al. (2008) studies a variety of countries around the world, including the UK and mainly finds negative relationships, while they find no significant relationship for firms in the UK. Overall, most support is found for the pecking order theory, therefore I also expect the following negative relationship:

Hypothesis 8: Liquidity has a negative effect on leverage

2.4.8 Stock listing

In general, information on firms listed on a stock exchange is more widely available than on unlisted firms and it is therefore assumed that listed firms have easier access to external financing than unlisted firms (Jõeveer, 2013b). Although listed firms might have easier access to external financing, it does not necessarily mean that they make use of this opportunity. Besides, external financing not only consists of debt-, but also from equity financing. Therefore, the direction of the relation with regard to stock listing is not clear at first. When relating the effect of stock listing on leverage to the capital structure theories, several implications are found.

As listed firms are more transparent to the outside, Schoubben and Van Hulle (2004) reason that from a trade-off perspective, listed firms face lower expected bankruptcy costs, resulting in that

listed firms would benefit from using more debt. Similarly, as a result of reduced transparency in unlisted or private firms, informational asymmetries are more severe. Since equity is not backed by collateral in case of default, information asymmetries have an even bigger effect on the cost of equity compared to the cost of debt (Brav, 2009; Jõeveer, 2013b). Therefore, from a pecking-order perspective the use of equity will be less appealing for unlisted firms. Similar to the discussion on firm size, listed firms are better known, are expected to face lower interest costs on debt, as well as having more bargaining power towards banks and other institutions alike. As a result, public firms are less dependent on banks to acquire external financing (Schoubben & Van Hulle, 2004). Hence, listed firms are expected to be higher leveraged. On the other hand, the cost of issuing equity is higher for unlisted firms than for listed firms, as it is very difficult to sell a share of an unlisted firm for the following reasons. First, selling shares of an unlisted firm often requires approval of the other shareholders, who are in general not keen on attracting outsiders into the firm. Second, the value of an unlisted share is expected to be lower due to the absence of a market that establishes the price based on supply and demand, as well as it being much more difficult to trade. This implies that listed firms are less levered as issuing equity is less expensive. Ultimately, the pecking order theory predicts that unlisted firms are higher leveraged compared to their listed counterparts. From an agency perspective, it is expected that unlisted firms are less levered, as their ownership concentration is much higher than within listed firms, thus having less need for the disciplinary effect of debt (Schoubben & Van Hulle, 2004). For this reason, agency problems are expected to be more severe for listed firms as there is more dispersion between ownership and control (Brav, 2009), thus suggesting a positive relationship for listed firms. On the contrary, Brav (2009) states that stock listing may also be a substitute to debt as a disciplinary device, as listed firms run the risk of hostile takeovers. Besides, managerial decisions are also being more exposed to the public, pushing managers towards making decisions in line with the best interests of the firm and its shareholders, suggesting a negative relationship.

With regard to the empirical evidence, the results are more in line with each other. Brav (2009) finds a significantly negative relationship in UK firms between the effect of stock listing and leverage. Other studies like Schoubben and Van Hulle (2004), who studies Belgian listed firms, and Jõeveer (2013b) confirm this negative relationship. For instance, Jõeveer (2013b) finds that unlisted firms in the UK use 69% of leverage (trade-credit included), whereas listed firms use 49% of leverage. In addition, these ratios are more or less similar to the other European countries included in their study. Therefore, I also expect to find a negative relationship:

Hypothesis 9: Stock listing has a negative effect on leverage

Table 1: Hypotheses overview

VARIABLE:	HYPOTHESIZED DIRECTION:	POT:	TOT:	AT:
PROFITABILITY	-	-	+	+
FIRM SIZE	+	+	+	+/-
TANGIBILITY	+	+	+	+
GROWTH	+/-	+	-	-
TAX SHIELDS	+		+	
NON-DEBT TAX SHIELDS	-		-	
RISK	-		-	+
LIQUIDITY	-	-	+	
STOCK LISTING	-	-	+	+/-

2.4.9 Control variables

Though not the main focus of this study, three additional variables are included in the regression models. However, no specific hypotheses are being formulated. The first variable that will be controlled for is firm age. According to the pecking order theory, older firms have the ability to stockpile retained earnings with every year they are in business (Dasilas & Papasyriopoulos, 2015). As a result, after a few years less external financing is needed (Mc Namara et al., 2017). Therefore, the pecking order theory predicts a negative relationship between age and leverage.

The second variable being controlled for is between industry variation. According to Jõeveer (2013), firms that operate in the same industry have similar optimal capital structures (also known as target debt ratio). As these optimal capital structures or target debt ratios are related to the trade-off theory, Cole (2013) Frank and Goyal (2009) argue that firms adjust their debt ratios towards the industry median. They reason that firms might be prone to common forces that affect their financing decisions. These could for example reflect heterogeneity in the types of assets within the industry, risk, technologies, and the nature of competition. Therefore, the trade-off theory proposes a positive relationship. Empirically, De Jong et al. (2008) included industry dummies into their analyses, though they did not find a significantly different result. On the contrary, Degryse et al. (2012) find significant results for every industry, implying that every industry has a significantly different target capital structure.

Finally, the third variable that is being controlled for is time. Due to the nature of data used (will be discussed in chapter 3), it is useful to capture the effects of time. For instance, it can capture macroeconomic trends throughout that potentially can affect the explanatory power of the model. By controlling for the effect of time, this study follows the approach of other studies such as Acedo-

Ramírez and Ruiz-Cabestre (2014), Bevan and Danbolt (2004), and Dasilas and Papasyriopoulos (2015) by including dummy variables for every year included in the sample.

3. Research methods

This chapter will address the issue of how this research is conducted. First, in section 3.1, several research methods used in other studies will be discussed, followed by the selection of the most appropriate model with regard to this specific study in section 3.2. Section 3.3 presents the empirical model used in this study. In addition, the strategy on how to measure the dependent-, independent- and control variables will be discussed in section 3.5. Moreover, section 3.5 discusses how the formed hypothesis are tested. Finally, section 3.6 will elaborate on how the data is acquired and which selection criteria are being used to comprise the final sample.

3.1 Previous research

As mentioned earlier, there has been a tremendous amount of research on capital structure determinants. Although most studies use similar methods, there is an ongoing debate on which method best suits capital structure research. For instance, the most widely used method is regression analysis (e.g. Dasilas & Papasyriopoulos, 2015; de Jong et al., 2008; Li & Islam, 2019), and to be specific the ordinary least squares method, also known as OLS (in case of panel data: Pooled OLS). Other widely used panel methods are fixed- and random effects models (Al-Najjar & Hussainey, 2011; Bevan & Danbolt, 2004; Degryse et al., 2012; Moradi & Paulet, 2019), and another technique called Generalized Method of Moments (Acedo-Ramírez & Ruiz-Cabestre, 2014; Dasilas & Papasyriopoulos, 2015; Mateev, Poutziouris, & Ivanov, 2013; Ozkan, 2001). However, it should be noted that these methods are often used in conjunction with each other, meaning that one is used as a primary or secondary method or as a robustness test as each method has its own strengths and weaknesses.

3.2 Methods

3.2.1 (Pooled) OLS

Unlike simple regression, multiple regression is a method that is able to test the relationships between a dependent variable and multiple independent variables (Hair, Black, Babin, & Anderson, 2014). More importantly, the objective of multiple regression is to predict the outcome of the dependent variable based on the known values of the independent variables. To be able to use regression analysis, it should be accounted for that all dependent- and independent variables are metric, implying that the underlying values are continuous of nature. This means that categorical, nominal and dichotomous variables cannot be used directly in multiple regression. As a result, these

types of variables need to be recoded as a dummy variable (with the value 1 or 0), if the researcher wants to include them in the research. However, this only applies to recoding of independent variables. If the dependent variable is non-metric another technique needs to be used, called: logistic regression (Hair et al., 2014). However, this study uses a metric dependent variable, which therefore excludes the use of logistic regression.

In order to estimate the correlation coefficient of the independent variables, several linear regression techniques are available. As mentioned, one of the most well-known techniques is called the 'Ordinary Least Squares' method, or OLS in short. Based on OLS, the dependent variable is predicted in a way that minimizes the squared residuals. These residuals are the individual differences between the predicted values and the known values in the dataset. Moreover, these residuals are squared to eliminate negative values. Therefore, the OLS method draws a linear line is through all data points that fits best and minimizes residuals, resulting in the regression coefficient (Hair et al., 2014; Henseler, 2019). Overall, it is clear to see why OLS is one of the most popular methods in research, as the method and the respective outcomes are rather easy to comprehend in comparison to other methods.

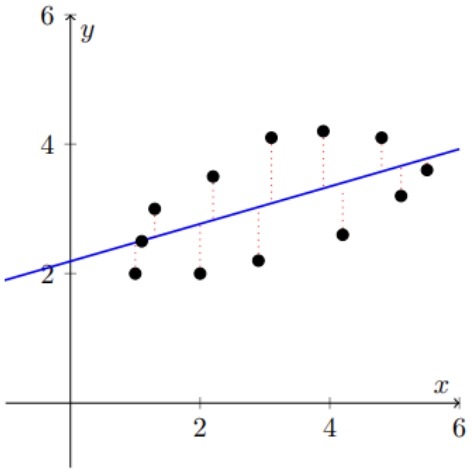


Figure 1: Simple representation of OLS (Henseler, 2019)

To be able to use regression in general, and to create meaningful results for interpretation, the data sample has to account for the following issues. First, the sample size has to be large enough to ensure that the model has enough power at higher significance levels (at 1% or 5%). Henseler (2019) states that the ratio between observations to variables is preferred to be 15 or 20. Second, there should be no influential observations in the dataset that potentially distort the results. Influential observations, also known as outliers, can be detected by critically looking at the results of univariate tests or by checking scatterplots. When found, they are often deleted from the dataset (Henseler, 2019).

Moreover, there are also assumptions specific to OLS, that have to be met. First, linearity between the independent variables and the dependent variable has to be established by checking the scatter- or partial regression plots (Hair et al., 2014; Henseler, 2019). Second, the error term is required to have equal variance (homoscedasticity). If no equal variance exists, heteroscedasticity is assumed, which is a violation of the assumption. Homoscedasticity can be tested by looking at the residual plots, or by other statistical tests like the Levene's test (Hair et al., 2014). Third, the error terms need to be uncorrelated with the independent variables (Henseler, 2019). Otherwise, endogeneity issues arise. Fourth, independence of the error term has to be considered. However,

according to Henseler (2019) this assumption is very difficult to verify. Therefore, this assumption is often considered based on theoretical reasoning. Fifth, the distribution of the error terms should be checked if these are deemed to be normal. One statistical method that is able to easily verify this assumption is by looking at the normal probability plots (Hair et al., 2014; Henseler, 2019). However, if the sample size is large enough (N > 200), a violation of this assumption can be ignored based on the Central Limit Theorem (Henseler, 2019). Finally, it should be tested whether multicollinearity occurs in the data. Independent variables can be correlated to each other to a certain degree, but when they are highly correlated (e.g. a correlation > 0.9), they could be influencing each other (Hair et al., 2014). For example, when one independent variable is explained by another set of independent variables, the problem called multicollinearity occurs. Therefore, they are potentially less able to predict the dependent variable well. However, multicollinearity can be detected by a statistical test called 'Variance Inflation Factor', or VIF in short. The outcome of this test is a value that shows the amount of multicollinearity in a model which is suggested to be below 10, or preferably even below 5. Deleting an independent variable that is part of the multicollinearity may resolve the issue, although most statistical programs do this automatically (Henseler, 2019). As mentioned, one of the biggest benefits of OLS is that it is rather easy to understand, and often so are the results. A downside of OLS is that in order to generate unbiased results, a lot of assumptions have to be fulfilled, as shown above.

3.2.2 Fixed- & random effects

Alongside regression analysis, researchers are also able to account for random- or fixed effects in their regression models. As stated in section 3.1, studies that incorporate fixed and/or random effects in their models include, but are not limited to Al-Najjar and Hussainey (2011), Bevan and Danbolt (2004), Dasilas and Papasyriopoulos (2015), Degryse et al. (2012) and Moradi and Paulet (2019). By including fixed- or random effects (FE or RE in short), the model can control for omitted time- and individual firm-specific heterogeneity in the model (Bevan & Danbolt, 2004; Degryse et al., 2012). The difference between fixed- and random effects is that fixed effects accepts the existence of correlation between unobservable effects, also known as omitted explanatory variables, and the included explanatory variables, whereas random effects does not (Serghiescu & Văidean, 2014). According to Bevan and Danbolt (2004), fixed or random effects is the preferred method over OLS, as failing to control for time-invariant firm-specific heterogeneity may lead to biased results. However, according to Bell and Jones (2015), a downside specific to fixed effects models may be that the model leaves out too much valuable information when time-invariant variables are being used, as these are dropped from the model.

Whether to use random- or fixed effects is determined by the outcome of the Hausman test. As described by Heyman et al. (2008): “the Hausman test can be used, which examines whether the difference between estimators generated by random-effects regression and the estimators generated by fixed-effects regression approximates zero.” (p. 308). In other words, when these differences are non-existent, the null hypothesis cannot be rejected and therefore the random-effects model should be used. On the contrary, when the null hypothesis is rejected, fixed effects should be used (Heyman et al., 2008).

3.2.3 Generalized method of moments

Another regression technique is called the ‘Generalized Method of Moments’, or GMM in short. Initially, GMM appears to be similar to the aforementioned fixed and random effects method. The GMM technique is also known for its ability to control for the presence of unobserved firm-specific effects, as well as being able to control for endogeneity problems in the explanatory variables (Mateev et al., 2013). According to Mateev et al. (2013), the instruments that are used in the model depend on an assumption that selects the right instrument when a certain type of variable is used. These variables are distinguished between three types, namely: endogenous, predetermined, or exogenous. As mentioned, GMM is used quite often in capital structure studies like Mateev et al. (2013), Ozkan (2001), Acedo-Ramírez and Ruiz-Cabestre (2014) and Dasilas and Papasyriopoulos (2015). One specific characteristic of GMM is that it uses a lagged dependent variable which makes it capable of using it in dynamic panel models. For instance, by using GMM in combination with a dynamic panel, the speed of adjustment towards a target debt ratio can be tested like in Ozkan (2001). However, it is questionable whether GMM’s specific characteristics are of additional value for this study, as this study uses a static panel. Therefore, the GMM method is not discussed further.

3.2.4 Model selection

Based on the aforementioned, this section will select the most appropriate model to use in this study. Although all three models discussed above are used in numerous capital structure studies, it is quite easy to eliminate GMM as an appropriate model with regard to this study. First, GMM is built around the use of a lagged dependent variable, while this study does not lag the dependent variables. Moreover, GMM is aimed to use in dynamic panels, that attempt to explain patterns occurring over time, something that is also not in the interest of this study. As a result, only two appropriate methods remain to decide between.

For this study, (Pooled) OLS appears to be the most appropriate as a primary model, as it is rather uncomplicated to implement, as well as to interpret. Besides, using OLS is also in line with

most recent empirical work, such as the studies by Li and Islam (2019) and Dasilas and Papasyriopoulos (2015), but also to older studies in the UK: Bevan and Danbolt (2002, 2004) and Ozkan (2001). Therefore, (Pooled) OLS is used as the primary model.

3.3 Empirical model

In order to answer the research question stated in the introduction, a panel data analysis will be conducted. Although data on individual firms is cross-sectional, it will be studied for five consecutive years where possible. According to Dasilas and Papasyriopoulos (2015), panel models are a superior substitute to cross-sectional methods, as they are better able to cope with multicollinearity between explanatory variables. Within panel models, there are two variants: balanced panel- and unbalanced panel models (Serghiescu & Văidean, 2014). A balanced panel is complete, meaning that data is available for every firm studied in the sample, over the entire period being studied. An unbalanced panel on the other hand, indicates that some observations are missing in the sample. Moreover, because complete firm data on unlisted firms is less widely available than listed firms, and to keep the sample size as large as possible, an unbalanced panel will be used.

As mentioned in section 3.2.4, ordinary least squares regression (OLS) will be used, to test the relationships between the independent variables and leverage. Moreover, to avoid reverse causality between independent variables and the dependent variables, the independent- and control variables are lagged one year, similar to most studies (Bevan & Danbolt, 2004; Frank & Goyal, 2009; Li & Islam, 2019). However, the dummy variables accounting for stock listing and the respective industries are not lagged, due to the fact that in general these variables are static and do not change (often). In addition, before conducting the regression analyses it is important to test whether the assumptions of OLS as mentioned in section 3.2.1 are met. The outcomes of these assumptions are presented in the corresponding results section. The regression model, which uses a similar approach to Li and Islam (2019) and Dasilas and Papasyriopoulos (2015), is specified as follows:

$$\text{Leverage}_{i,t} = \alpha + \beta_1 * \text{PROF}_{i,t-1} + \beta_2 * \text{SIZE}_{i,t-1} + \beta_3 * \text{TANG}_{i,t-1} + \beta_4 * \text{GROWTH}_{i,t-1} + \beta_5 * \text{TAX}_{i,t-1} + \beta_6 * \text{NDTS}_{i,t-1} + \beta_7 * \text{RISK}_{i,t-1} + \beta_8 * \text{LIQ}_{i,t-1} + \beta_9 * \text{LIST}_i + \beta_{10} * \text{AGE}_{i,t-1} + \beta_{11} * \text{IND}_i + \beta_{12} * \text{YEAR} + \varepsilon_{i,t}$$

Where leverage represents the dependent variable, α denotes the intercept also known as constant, β denotes the regression coefficients that are specific to the individual independent- and control variables, where *i* denotes an individual firm, *t* denotes the time in years, while *t-1* indicates that the variable is lagged one year. Finally, ε denotes the error term. The tested relationships are deemed statistically significant, when their respective p-values are below <.10, though preferably below <.05 or even <.01. To improve robustness, several other regression models will be tested. These are

specified whenever it appears to be necessary based on descriptive statistics, correlations or regressions. Therefore, they are not mentioned in this section.

3.4 Variables measurement

3.4.1 Dependent variables

Following Dasilas and Papasyriopoulos (2015), Degryse et al. (2012) and Matias and Serrasqueiro (2017), leverage is measured in three ways. First, as the total debt ratio (TD), which is computed by dividing the book value of total liabilities by the book value of total assets. To be specific, total liabilities is calculated by adding the current liabilities to the non-current liabilities. Second, by the long-term debt ratio (LTD), which is calculated in a similar way as the total debt ratio (TD), but only includes long-term liabilities instead of total liabilities. Finally, the short-term debt ratio (STD) is calculated by dividing the amount of current liabilities by total assets. However, it is worthy to note that Degryse et al. (2012) excludes trade credit in the calculation of the short-term debt ratio, while the others do not. Besides, some studies use the following terms interchangeably (e.g. Dasilas & Papasyriopoulos, 2015; Matias & Serrasqueiro, 2017), like long-term debt and non-current liabilities, as well as short-term debt and current liabilities, while others only explicitly mention the one or the other (Degryse et al., 2012; Jõeveer, 2013a). However, the database used (discussed in chapter 3.6), distinguishes non-current liabilities as the sum of long-term debt and other non-current liabilities. Examples of other non-current liabilities are deferred taxes and lease obligations with a maturity longer than 1 year. Also, current liabilities is distinguished as the sum of loans, creditors and other current liabilities. Other current liabilities may include but not be limited to taxes payable, wages and salaries payable, and lease obligations shorter than 1 year. This difference is important to note, however, I do not expect difficulties in the interpretation, as according to the database's manual these measures are widely tested and verified by accountancy practitioners (Bureau van Dijk, 2007). Besides, the reason for using liabilities instead of debt is that the database used to obtain the sample barely provides data on debt (N<200 on a random sample of over 12000 firms), while this was not the case for liabilities. However, in the remainder of this study the dependent variables are referred to as total debt, long-term debt and short-term debt due to the aforementioned reasons.

In general, these three measures of leverage are widely used in capital structure studies, although most studies only incorporate one of these three measures as their dependent variable. For instance, Acedo-Ramírez and Ruiz-Cabestre (2014) and Psillaki and Daskalakis (2009) only use the total debt ratio as their measure for leverage. Likewise, De Jong et al. (2008) solely includes the long-term-debt ratio (though partly based on market-values). They reason that short-term and total debt ratios are likely difficult to interpret due to the inclusion of trade credits. However, according to

Bevan and Danbolt (2002), trade credit and equivalent accounts for more than 62 percent of total liabilities, thus showing its importance in capital structures. Moreover, they state that "analyses of gearing[1] based solely upon long-term debt provide only part of the story, and a fuller understanding of capital structure and its determinants requires a detailed analysis of all forms of corporate debt" (Bevan & Danbolt, 2002, p. 169). Hence, to be complete this study includes all three debt ratios, though there are no specific hypotheses defined regarding differences between the effect on one or the other dependent variables.

3.4.2 Independent variables

In the literature, there is some variation in how certain variables are measured. However, this study will follow earlier research, by using the most common measurements. As mentioned, with the exception of dummy variables, all independent variables are lagged one year. First, profitability is often measured as the earnings before interest, taxes and depreciation (EBITD) divided by total assets (Degryse et al., 2012; Li & Islam, 2019). While being similar to EBITD, EBITDA also accounts for amortization. Examples of studies (though less recent) that use EBITDA are Bevan and Danbolt (2002, 2004), Gaud, Hoesli, and Bender (2007) and Rajan and Zingales (1995). Other studies also use EBIT, thus without subtracting depreciation, but as this study also considers non-debt tax shields separately, it is therefore less relevant to exclude depreciation from the profitability measure (Degryse et al., 2012). Due to data limitations with regard to EBITD, EBITDA will be used as a measure for profitability. In general, there are two ways in how firm size is measured. In some studies, it is calculated as the natural logarithm of sales (Acedo-Ramírez & Ruiz-Cabestre, 2014; Kayo & Kimura, 2011; Li & Islam, 2019). Others use the natural logarithm of total assets (Al-Najjar & Hussainey, 2011; Degryse et al., 2012; Serghiescu & Văidean, 2014). This study will measure firm size based on the natural logarithm of sales (operating revenue). Tangibility is measured as the ratio of fixed tangible assets to total assets (Al-Najjar & Hussainey, 2011; Degryse et al., 2012; Kayo & Kimura, 2011; Li & Islam, 2019).

To capture the effects of growth, several measurement methods are available in the literature. For instance, to measure growth opportunities most studies use market-to-book ratio (e.g. Bevan and Danbolt (2004)), however, it is not possible to replicate that measure due to the sole use of book values in this study (market values on unlisted firms are unknown). Intangible assets are also used as a proxy for both growth as well as growth opportunities (Degryse et al., 2012; Moradi & Paulet, 2019). Although, in hindsight this measure did not provide sufficient observations to be used. Another possibility that is often used is that of sales- or assets growth (Degryse et al., 2012; Iqbal &

[1] Synonym for leverage

Kume, 2014; Matias & Serrasqueiro, 2017; Moradi & Paulet, 2019; Psillaki & Daskalakis, 2009). Following Degryse et al. (2012) and Matias and Serrasqueiro (2017), growth is measured as the total assets at year 1, minus total assets at year 0, divided by total assets at year 0. Tax shields are measured as the ratio of taxes paid to earnings before taxes (Acedo-Ramírez & Ruiz-Cabestre, 2014; de Jong et al., 2008; Degryse et al., 2012; Mc Namara et al., 2017). Non-debt tax shields on the other hand, can include several measures like net operating loss carryforwards, investment tax credits, depreciation expenses, amortization, depletion, advertising, and research & development (Frank & Goyal, 2009; Moradi & Paulet, 2019). Similar to Acedo-Ramírez and Ruiz-Cabestre (2014), Degryse et al. (2012) and Frank and Goyal (2009), this study measures non-debt tax shields by depreciation expenses divided by total assets.

Earnings volatility is used as a proxy for risk. However, in the literature there are multiple ways of measuring earnings volatility. Moradi and Paulet (2019) and Wald (1999) use the standard deviation of earnings before interest and taxes (EBIT) scaled by total assets. Similarly, de Jong et al. (2008) uses operating income scaled to total assets instead of EBIT, which is a minor difference, as EBIT also includes non-operating income. Iqbal and Kume (2014) measure earnings volatility as the standard deviation of sales scaled by the average of sales, while Psillaki and Daskalakis (2009) take the standard deviation of earnings before taxes (EBT) from the period average. Alternatively, Frank and Goyal (2009) use the variance of stock returns, an approach that is not possible to replicate for the entire sample. Quite similar to Iqbal and Kume (2014), Abdou et al. (2012) use the standard deviation of EBIT divided by the average of EBIT. This study will use a similar measurement as Moradi and Paulet (2019), de Jong et al. (2008) and Wald (1999) for earnings volatility, thus taking the standard deviation of EBIT over the sample period scaled to total assets. This implies that every firm in the sample only has one value for risk over the sample period before scaling it to total assets.

Degryse et al. (2012) uses net debtors as a proxy for liquidity and measures it by subtracting creditors from debtors, and later scaling it to total assets. Cole (2013) on the other hand uses the ratio of cash and cash equivalents to total assets, while others measure it by the current ratio (de Jong et al., 2008; Gungoraydinoglu & Öztekin, 2011; Mateev et al., 2013). This study will follow the latter approach, meaning that liquidity is measured using the ratio of current assets to current liabilities. Finally, to account for whether a firm is listed on a stock exchange or not, this study follows the approach of Brav (2009), Schoubben and Van Hulle (2004) and Demirgüç-Kunt et al. (2020), meaning that a dummy variable is being used, indicating 1 if the firm is listed, with 0 being the reference category indicating that a firm is not listed.

3.4.3 Control variables

According to Psillaki and Daskalakis (2009), including age as a regressor in panel models is not possible. Interestingly, Mc Namara et al. (2017) also use panel data, but do include age measured as year of data minus year of firm's birth. Similarly, others use the same calculation, however they convert it into the natural logarithm (Dasilas & Papasyriopoulos, 2015; Matias & Serrasqueiro, 2017). This study will follow the same approach by converting it into a logarithm. To be able to control for variation between industries, I will follow a similar approach to Degryse et al. (2012) and de Jong et al. (2008), namely by adding dummy variables for each specific industry to the regression model based on industry classifications. These classifications will be based on SIC codes, and will be categorized in a similar way to the approach of Dasilas and Papasyriopoulos (2015). To be specific, these will be categorized into the following six industries: agriculture, forestry and fishing (SIC code 0000-0999); Mining and construction (SIC code 1000-1999); manufacturing (SIC code 2000-3999); Transportation and communication (SIC code 4000-4899); Wholesale and retail trade (SIC code 5000-5999); and Services (SIC code 7000-8999). To be specific, within the regression models the manufacturing industry will serve as the reference category. Finally, following Acedo-Ramírez and Ruiz-Cabestre (2014), Bevan and Danbolt (2004), and Dasilas and Papasyriopoulos (2015), each year of data included in this study is added as a dummy variable to control for time with 2014 being the category of reference.

Table 2: Measurement of variables

	ABBREVIATION:	MEASUREMENT:	SOURCE:
DEPENDENT VARIABLES:			
TOTAL DEBT	TD	(Non-current liabilities + current liabilities) / total assets	(Dasilas & Papasyriopoulos, 2015; Degryse et al., 2012; Matias & Serrasqueiro, 2017)
LONG-TERM DEBT	LTD	Non-current liabilities / total assets	(Dasilas & Papasyriopoulos, 2015; Degryse et al., 2012; Matias & Serrasqueiro, 2017)
SHORT-TERM DEBT	STD	Current liabilities / total assets	(Dasilas & Papasyriopoulos, 2015; Degryse et al., 2012; Matias & Serrasqueiro, 2017)
INDEPENDENT VARIABLES:			
PROFITABILITY	PROF	Earnings before interest, taxes, depreciation and amortization (EBITDA) / total assets	(Bevan & Danbolt, 2002, 2004; Gaud et al., 2007; Li & Islam, 2019; Rajan & Zingales, 1995)
FIRM SIZE	SIZE	Logarithm of sales (operating revenue)	(Acedo-Ramírez & Ruiz-Cabestre, 2014; Kayo & Kimura, 2011; Li & Islam, 2019)
TANGIBILITY	TANG	Fixed tangible assets / total assets	(Al-Najjar & Hussainey, 2011; Degryse et al., 2012; Kayo & Kimura, 2011; Li & Islam, 2019)
GROWTH	GROWTH	(Total assets (t) – total assets (t-1) / total assets (t-1)	(Abdou et al., 2012; Degryse et al., 2012; Matias & Serrasqueiro, 2017)
TAX SHIELDS	TAX	Taxes paid / earnings before taxes	(Acedo-Ramírez & Ruiz-Cabestre, 2014; de Jong et al., 2008; Degryse et al., 2012; Mc Namara et al., 2017)
NON-DEBT TAX SHIELDS	NDTS	Depreciation expenses / total assets	(Acedo-Ramírez & Ruiz-Cabestre, 2014; Degryse et al., 2012; Frank & Goyal, 2009)

RISK/ EARNINGS VOLATILITY	RISK	Standard deviation of earnings before interest and taxes (EBIT) over the sample period / total assets	(Moradi & Paulet, 2019; Wald, 1999)
LIQUIDITY	LIQ	Current assets / current liabilities	(de Jong et al., 2008; Gungoraydinoglu & Öztekin, 2011; Mateev et al., 2013)
STOCK LISTING	LIST	Dummy variable, 1 for listed firms and 0 for otherwise	(Brav, 2009; Demirgüç-Kunt et al., 2020; Schoubben & Van Hulle, 2004)
CONTROL VARIABLES:			
AGE	AGE	Logarithm of (year of data - year of birth)	(Dasilas & Papasyriopoulos, 2015; Matias & Serrasqueiro, 2017)
INDUSTRY	IND	Dummy variable per industry, 1 for the specific industry, and 0 for otherwise	(Dasilas & Papasyriopoulos, 2015; de Jong et al., 2008; Degryse et al., 2012)
YEAR	YEAR	Dummy variable for each year of data, 1 for the specific year, and 0 for otherwise	(Acedo-Ramírez & Ruiz-Cabestre, 2014; Bevan & Danbolt, 2004; Dasilas & Papasyriopoulos, 2015)

3.5 Hypothesis testing

This section will describe how the hypotheses, as covered in chapter 2.3, are tested in the regression model as formulated in section 3.3. It is important to note that all hypotheses are tested by regressing the corresponding independent variable to the three dependent variables of leverage, namely: total debt ratio, long-term debt ratio and short-term debt ratio. As mentioned in section 3.3, the tested relationships are deemed statistically significant, when their respective p-values, also known as probability values, are below <.10, though preferably below <.05 or even <.01.

The formed hypothesis should be accepted or rejected based on the following terms. For instance, when the regression coefficient has the correct hypothesized direction and is statistically significant, the null hypothesis can be rejected, confirming the alternative hypothesis formed. In all other cases, when the null hypothesis cannot be rejected, the alternative hypothesis should be rejected. As an example, when the independent variable profitability has a negative and statistically significant effect on leverage, hypothesis 1 can be confirmed as it is statistically significant and it has the correct hypothesized direction. On the contrary, when the independent variable profitability shows a positive and significant effect, hypothesis 1 should be rejected. Moreover, when the independent variable shows a positive or negative effect, but the effect is not statistically significant, no meaningful interpretations can be formed based on the outcome, rejecting the formed alternative hypothesis.

3.6 Data

Data on UK (includes England, Scotland, Wales and Northern Ireland) firms will be acquired from ORBIS, which is a database built by Bureau van Dijk (BvD) and contains financial data of millions of companies around the globe. It not only contains data on firms that are listed on a stock exchange, but also data from non-listed firms. This study will use data of both types of firms. As a result, the acquired data will be solely based on book values, as market values are not known for non-listed firms (Degryse et al., 2012). Thus, it is also not meaningful to include market values of listed firms, as there would be no grounds for proper comparisons between listed and non-listed firms. In addition, it is worthy to note that all data is presented in the local currency used, meaning that it is formatted in GBP. Moreover, it is important to note that where Brav (2009) distinguishes between private and public firms, whereas this study distinguishes between listed and unlisted firms as these definitions can differ significantly. According to Brav (2009), firms in the UK can be public and listed on a stock exchange, but they can also be public but not being listed on an exchange. Logically speaking, besides the two mentioned types there are also private firms which cannot be listed. As standard in most

capital structure studies, financial (SIC code 6000), utility (SIC code 4900) and public (SIC code 9000) firms are excluded, as their capital structures are most likely to be different due to regulatory requirements (Al-Najjar & Hussainey, 2011; Brav, 2009; Dasilas & Papasyriopoulos, 2015; de Jong et al., 2008; Ozkan, 2001). In addition, to determine to which industry a firm belongs, firms are selected based on their primary SIC-code, despite potentially delivering other services or goods. In other words, firms are categorized based on their core business.

As mentioned in section 3.2.1, influential observations or outliers are often deleted from a dataset. However, this study has incorporated winsorization to eliminate outliers, which is a similar approach to Acedo-Ramírez and Ruiz-Cabestre (2014), Bevan and Danbolt (2004), Demirgüç-Kunt et al. (2020), Gungoraydinoglu and Öztekin (2011) and Öztekin (2015). In short, winsorization is the process of modifying values that lie within the lower and or upper percentiles with the next value outside the percentiles to eliminate outliers. To be specific, all metric variables (except for age and the dichotomous variables stock listing, industry and year) are winsorized at the 5% level, meaning that the lower- and upper 2.5% percentiles are winsorized. However, most of the aforementioned studies use winsorization at the 2% level except for Bevan and Danbolt (2004), who also winsorized at the 5% level (a further explanation why this study uses a higher level of winsorization is discussed in chapter 4.1).

Besides using winsorization, firms with missing data will be removed (listwise removal of missing values) to improve the quality of data. However, this does not mean that a firm needs to have values for every variable for every year, as that would imply a balanced sample. Therefore, a firm can be included if it for instance has complete data on 4 out of the 5 year sample period. As a result, this still implies an unbalanced panel, therefore mitigating the problem of survivorship bias (Bevan & Danbolt, 2004; Dasilas & Papasyriopoulos, 2015). Also, to improve the quality of data even further, firms with less than 10 employees (micro firms) are excluded from the sample, which is similar to Dasilas and Papasyriopoulos (2015). However, it is important to note that this requirement is not a necessity for every year in the sample, implying that a firm is included in the sample when it has reported at least 10 employees for at least one of the sample years. Otherwise, if the requirement had to be met for every period in the sample, the aforementioned problem of survivorship bias would arise again.

The sample will be comprised of data for the consecutive years 2014 till 2018. To be able to lag the independent variables with regard to data from 2014, data from 2012 and 2013 also have to be collected, although the main focus is on the degree of leverage used in the UK in the years of 2014 till 2018. Data from 2019 is not yet included in this study, because the amount of data available in the ORBIS database over 2019 is potentially lower than earlier years, lowering the size of the final sample. Moreover, a time period spanning five years has been chosen, which is in line with other

empirical work (e.g. Dasilas & Papasyriopoulos, 2015; de Jong et al., 2008). However, other studies also employ larger periods like ten years, though due to a large amount of data available on UK firms, the number of observations is already quite high when using a 5-year period. Earlier years are not included in the sample for two reasons. First, earlier years like 2007 till 2009 are not included due to the financial crisis which economies worldwide, which might have affected their capital structures in an unnatural way during that period (Demirgüç-Kunt et al., 2020). Second, as mentioned in section 1.2, by only focusing on recent years, this study contributes by providing up-to-date knowledge, helping practitioners to make more meaningful decisions with regard to their financing decisions.

The final sample comprises of 12169 firms from the UK, of which 276 firms are listed and 11893 are unlisted, resulting in a maximum of 60845 observations per variable due to the use of a 5-year period. By using an unbalanced panel, the amount of observations per variable differs. Although a sample of 12169 firms is already quite large in comparison to other studies, it could be considerably larger if the ORBIS database did not have a limitation when using a large number of variables. With the number of variables in this study, this limit is set at 12195 firms, therefore, a random sample of 12195 firms has been drawn from the ORBIS database. Note that there is a difference of 26 firms between the aforementioned numbers. These firms have been manually deleted from the sample, as these belonged to the financial sector (SIC code 6000) and somehow still ended up in the sample despite being excluded as mentioned earlier.

4. Results

This chapter presents and discusses the most important results based on multiple analyses. First, section 4.1 provides a discussion of the descriptive statistics. Second, section 4.2 will present and discuss the Pearson's correlation matrix. Third, section 4.3 presents and discusses the outcomes of the assumptions. Fourth, to test the hypotheses formed in chapter 2.4, section 4.4 discusses the results of the regression model as presented in chapter 3.3. Finally, section 4.5 discusses the results of several robustness checks ran to verify the robustness of the primary regression models.

4.1 Descriptive statistics

As mentioned in chapter 3.6, most variables are winsorized at the 5% level, whereas others are not winsorized. To be specific, the variable age as well as all the dummy variables are not winsorized for the following reasons. First, age is not winsorized as it is more or less an absolute number specific to a single firm. For instance, firm age can never have a value below zero, nor can the value for age increase by more than one, each year. Second, dummy variables are not winsorized as these variables cannot include extreme values (with 1 and 0 being the only possibility). Winsorization at the 5% level (meaning that the upper- and lower tails are winsorized by 2.5%) is chosen, as due to the large sample size, the 5% level is more capable of eliminating outliers. To be specific, the 2% level winsorization has initially been tested on the sample, though it was not sufficient to eliminate outliers.

When comparing the descriptive statistics as seen in table 3 with other studies, it could be seen that most statistics are in line with other studies, while others are more surprising. For instance, the total debt ratio is on average 61%, which is similar to Cole (2013), who finds a mean of 58% for US firms. In addition, Jõeveer (2013a) also finds a mean leverage of 61% while studying firms in Eastern European countries. Surprisingly, studies on UK firms often find lower mean values for leverage. Bevan and Danbolt (2004) and Devereux Maffini, and Xing (2018) for instance find averages of 49% and 46% respectively. However, these differences could be the result of the following issues. First, Bevan and Danbolt (2004) only study listed firms, while Brav (2009) found that private firms use significantly more debt than listed firms do. Second, Devereux et al. (2018) is a study on tax returns in the UK, in which they explicitly mention that the mean of 46% is only based on profitable firms. However, the mean leverage of loss-making firms is 55%, which is closer to the mean found in this study. Also, this study does not differentiate between profitable and loss-making firms, making it a more realistic representation of all firms in the UK. With regard to the normality of the data, the median of the total debt ratio lies at almost 60%, implying a normal distribution of data.

When studying the long-term debt ratio, it could be seen that the mean of 12.4% is much lower than the total debt ratio of 61%. This implies that firms mostly use short-term debt in their financing behavior. Compared to others, de Jong et al. (2008) and Bevan and Danbolt (2004) find that on average, UK firms use 8.4% and 9% long-term debt respectively. Again, these numbers might be lower due to the use of listed firms only, which have more possibilities to acquire funds (e.g. equity issue) compared to unlisted firms. Similarly, Mc Namara et al. (2017) find that European firms on average use 9.5% of long-term debt. On the contrary, higher averages are also found, as Dasilas and Papasyriopoulos (2015) found an average of 20% for Greece firms, while Matias and Serrasqueiro (2017) find a mean of 19% for long-term debt. More importantly, whereas the mean for total debt ratio lies close to the median, this is not the case for long-term debt. To be specific, the mean of 12.4% is closer to the 75th percentile (15.8%) than to the median (3%), implying that the distribution of the long-term debt ratio is skewed to the right.

With regard to the short-term debt ratio, a mean of 47.5% is found, implying that UK firms mostly use short-term debt to finance their financial needs. This number is quite high, although it is important to note that in this study creditors are included in the calculation of the short-term debt ratio. Compared to others, similar values are found. For instance, Matias and Serrasqueiro (2017) find an average of 46%, whereas Dasilas and Papasyriopoulos (2015) find a mean of 40%. In two older studies on UK firms, Bevan and Danbolt (2002, 2004) find a mean of 40%, though more interestingly, Bevan and Danbolt (2002) show that this 40% consists of about 30% trade credit and 10% borrowing repayable in less than a year. When comparing the mean and median of the short-term debt ratio, it could be seen that the median lies at 44.4%, which is close to the mean of 47.5%.

One element that should be highlighted is that as seen in table 3, the maximum values of the short-term debt ratio and the total debt ratio are above 1 (thus being more than 100%). This indicates that a firm has more liabilities than it possesses assets, resulting in a negative value for equity. This implies that these firms (with debt ratios higher than 1) are in financial distress. To be specific, 1058 observations with a value above 1 are found for the total debt ratio, where 2589 observations above 1 are found for the short-term debt ratio. This corresponds to roughly 212 and 518 firms (observations divided by the 5-year sample period) for the total debt- and short-term debt ratio respectively, although this number of firms may be higher as it does not necessarily need to have debt ratios above 1 for every year in the sample. Initially, firms with these kinds of debt ratios could be seen as outliers, however, it cannot be denied that there are also firms in financial distress in the population of UK firms. Therefore, these firms will remain in the sample. More importantly, where most studies only report means, medians and standard deviations, there are only a few who also report minimum- and maximum values. Therefore, it is difficult to assess whether most studies find similar maximum values. However, some studies do report them. For instance, Degryse et al.

(2012) report a maximum value of about 1.7 and 1.5 for total- and long-term debt respectively, whereas Cole (2013) finds total debt ratios varying between 1.2 and 2.3 depending on the year. Besides, some studies report questionable maximum values, such as Dasilas and Papasyriopoulos (2015) who report a maximum of 5.8, but also Mc Namara et al. (2017), who finds a value of 52.6 using the same measurement as used in this study. Nevertheless, to improve robustness another regression model will be run that caps the debt ratios at a maximum value of 1.

In table 3, it could be seen that on average UK firms have a profitability of 11%. This average is slightly lower than the mean of 13.6% found by Bevan and Danbolt (2004), though it is more in line with Ozkan (2001) who find a mean of 10.3% for UK firms. De Jong et al. (2008) also find a lower value of 9.2%, but this might be the result of a slightly different measurement method. Compared to other countries, the results are mixed. For instance, Heyman et al. (2008) find a mean of 12.7% for private firms in Belgium, whereas Degryse et al. (2012) finds that Dutch small firms on average have an even higher profitability of 15.3%. Based on the results of Jõeveer (2013a) it could be seen that Eastern European firms are less profitable at 8.7%. In addition, Demirgüç-Kunt et al. (2020) find a mean of 8% based on a large sample across 75 countries, thus implying that UK firms are on average more profitable than firms in most countries. When comparing the minimum and maximum values of profitability, it could be seen that the least profitable firm(s) in the sample has a value of -19.6%, while the most profitable firm(s) realises a profitability of 45.7%.

While firm size is measured as the logarithm of sales for usage in the regression analysis, in table 3 it is presented in its original form for the sake of clarity, as it is difficult to interpret the descriptive when it is presented as a natural logarithm. Therefore, firm size is presented in millions (GBP). For this variable a mean of 53.9 million GBP is found, with a median of 20.1 million GBP, implying a right-skewed distribution. In addition, with a minimum value of 2.9 million GBP, it could be concluded that there are some small firms in the sample, but with a 25^{th} percentile at 11 million GBP and a maximum of 466 million GBP (multiple billion values are eliminated due to winsorization), it could be seen that the sample contains a range of small and medium-sized firms all the way up to very large firms. Similarly, Dasilas and Papasyriopoulos (2015) found a mean of 50.2 million euros, which is a slightly lower value in GBP. However, they also found a minimum value of 2 million and a very high maximum value of 2.2 billion (winsorized at 1%), therefore it could be assumed that their sample and the one used in this study are quite similar in terms of firm size.

As seen in table 3, the average amount of fixed tangible assets a UK firm possesses is 23.5% of the total assets it has on the balance sheet. This is in line with Li and Islam (2019) who find a mean of 24.2% for Australian firms, but also with Mc Namara et al. (2017) who find an average of 24.1% based on a sample of European SMEs. Similarly, Kayo and Kimura (2011) find a slightly higher average of 27.9% in developed countries (G7-countries). Moreover, the minimum found in this study is 0%

with a maximum of 91.3%, although most values are smaller as the median and the 75th percentile lie at 11.8% and 36.3% respectively. However, this distribution is in line with Mc Namara et al. (2017) as they find similar numbers (except for the minimum value), but also with Dasilas and Papasyriopoulos (2015) and Degryse et al. (2012) who find similar maximum- and minimal values.

As stated earlier, growth is measured by the change in total assets between year t and t-1, scaled by total assets at the year t-1. Table 3 presents a mean value for growth of 12.7%, implying that based on their assets, a UK firm grows by 12.7% on average each year. This pattern is in line with Matias and Serrasqueiro (2017) who find a mean of 11.5%, but also with Degryse et al. (2012) that find an average growth of 13.3%. When looking at the other statistics, it could be seen that the minimum value is -46.6% and the maximum value is 122.6%. This implies that some firm(s) lost almost half of their value in assets in one year, whereas another has more than doubled the value of its assets. Compared to the mean, the median value lies at a lower value of 6.7%, implying a right-skewed distribution. However, the distribution is not extremely skewed as the 75th percentile lies at 20.9%, which is still much higher than the mean of 12.7%.

As explained in chapter 2.4.5, a tax shield originates from the interest a firm is obliged to pay on a loan, which in turn is deductible in the calculation of taxes, resulting in a lower effective tax rate. As seen in table 3, the average tax shield is 16% which is similar to the 14% found by Fan et al. (2012) for UK firms, but lower than the 21.2% found by de Jong et al. (2008) and higher than Mc Namara et al. (2017) who finds a mean of 11.5%. Again, these differences might be the result of using different types of firms in studies, where one uses listed firms while the other uses SMEs. Moreover, the studies of Fan et al. (2012) and Degryse et al. (2012) find comparable minimum and maximum values to this study. Where tax shields are the result of deductible interest expenses, non-debt tax shields are the result of depreciation costs. For this variable, a mean of 3.3% is found, meaning that on average the value of a firm's assets depreciates by 3.3% each year. This result is in line with Dasilas and Papasyriopoulos (2015) (3%) and Ozkan (2001) (3.6%). In addition, it is also similar to Acedo-Ramírez and Ruiz-Cabestre (2014) (4.1%) and Moradi and Paulet (2019) (4%). The median found in this study lies at 2.3% which is in line with the median of 2% found by Dasilas and Papasyriopoulos (2015).

As seen in table 3, the average risk based on earnings volatility in UK firms is 8.5%. This result is in line with De Jong et al. (2008) who find a mean of 8.2% specific to the UK. In addition, two older studies find slightly different means. To be specific, Michaelas et al. (1999) found a slightly higher mean of 9.8% specific to small firms in the UK, whereas Wald (1999) finds a mean of 6% and 7.3% for UK and US firms respectively. However, these differences could simply be the result of using different samples, as these differences are not extremely large. Furthermore, it could be seen that the median is almost half of the mean at 4.7%, implying that most firms in the sample are rather stable, but that

there is a smaller range of firms that are more volatile as could be concluded based on the 75th percentile and the maximum value. However, a high value for risk does not necessarily mean that a specific firm lost many of its earnings, but could also be the result of high earnings growth as this also is a form of volatility.

Liquidity is measured by the current ratio, which measures how capable a firm is in paying its short-term liabilities. It is worthy to note that in practice a current ratio of about 1.5 is considered to be healthy, while a value lower than 1 implies that a firm has more liabilities to fulfill within a year than it has current assets. In table 3 it could be seen that the mean of liquidity is 2.05, which is considered to be quite healthy. Moreover, this is similar to the result of 2.26 found by de Jong et al. (2008) on UK firms, but also to Mateev et al. (2013) who found a slightly lower mean of 1.93. Furthermore, the minimum value of 0.24 is very low, however, the 25th percentile already lies above 1 with the median at 1.46. In addition, the maximum value of 9 can be considered really high, which might indicate inefficient use of working capital. Compared to the distribution in the study of Mateev et al. (2013), this study shows much more normal values, as their mean lies above the 75th percentile and has a maximum value of 125, which can be considered extreme.

Stock listing is accounted for by a dummy variable with the value 1 for listed firms and 0 for unlisted firms. Table 3 presents a mean of 2.3%, implying that only 2.3% of the firms in the sample are listed. This is in line with Demirgüç-Kunt et al. (2020) who find that 2% of their sample is listed on a stock exchange. In addition, Brav (2009) states that 97.5% of all companies in the UK are private firms, meaning that only 2.5% of all firms are public. Therefore, the sample used in this study can be considered a representation of the population of firms in the UK with regard to stock listing. However, due to the dominance of unlisted firms in the sample, a split sample regression of listed and unlisted firms will be run to improve robustness.

As seen in table 3, the values for age range from a minimum of 0 to a maximum of 276 years (this extreme value of 276 has been manually checked and found to be correct). Moreover, the mean age of a firm is 24 years, with a median of 18 years and the 75th percentile at 31 years, meaning that only 25% of firms in the sample is older than 31 years. Compared to others, Matias and Serrasqueiro (2017) find a mean of 16 years based on their Portuguese sample, which is closer to the median found in this study. In addition, Dasilas and Papasyriopoulos (2015) find a higher average mean at 33 years of operation with a median of 29 years, implying that on average Greek firms are older than firms in the United Kingdom. Finally, the distribution of firms across industries as classified in chapter 3.4.3 is as follows. The dummy accounting for the agriculture, forestry and fishing industry has quite a low value of 1.4%, therefore it appears that this industry is underrepresented compared to Dasilas and Papasyriopoulos (2015) who found a mean of about 10%. Next, the mining and construction industry represents 9.7% of the sample, whereas the manufacturing industry accounts for 19.7% of

the sample. The transport and communication industry represents a 6.6% share of the sample, while the wholesale and retail industry accounts for a larger 20% of the sample. At last, the most dominant industry in the sample is the services industry, with a large share of 42.6% of the final sample. To see whether the services industry significantly influences the results, an additional robustness check will be run which includes all industries except the services industry, as well as another model that tests the services industry separately.

Table 3: Descriptive statistics

	Mean	St.Dev.	Min.	25th percentile	Median	75th percentile	Max.	N
DEPENDENT VARIABLES:								
TOTAL DEBT	0.610	0.331	0.062	0.363	0.598	0.815	1.552	55799
LONG-TERM DEBT	0.124	0.196	0.000	0.001	0.030	0.158	0.808	55839
SHORT-TERM DEBT	0.475	0.298	0.023	0.237	0.444	0.687	1.201	55802
INDEPENDENT VARIABLES:								
PROFITABILITY	0.110	0.130	-0.196	0.037	0.095	0.171	0.457	48612
FIRM SIZE (IN MILLIONS*)	53.923	94.334	2.873	11.181	20.143	45.840	466.283	50398
TANGIBILITY	0.235	0.269	0.000	0.026	0.118	0.363	0.913	53924
GROWTH	0.127	0.311	-0.466	-0.024	0.067	0.209	1.226	53909
TAX SHIELDS	0.160	0.182	-0.350	0.084	0.193	0.224	0.635	42881
NON-DEBT TAX SHIELDS	0.033	0.033	0.001	0.009	0.023	0.045	0.139	53002
RISK	0.085	0.105	0.006	0.024	0.047	0.095	0.492	51714
LIQUIDITY	2.053	1.802	0.244	1.044	1.461	2.348	9.016	55467
STOCK LISTING	0.023	0.149	0	0	0	0	1	60845
CONTROL VARIABLES:								
AGE (IN YEARS*)	23.987	22.294	0.000	9.000	18.000	31.000	276.000	59361
IND_AGRIFORFISH	0.014	0.118	0	0	0	0	1	60845
IND_MINCON	0.097	0.295	0	0	0	0	1	60845
IND_MANU	0.197	0.398	0	0	0	0	1	60845
IND_TRANSCOMM	0.066	0.248	0	0	0	0	1	60845
IND_WHOLERETAIL	0.200	0.400	0	0	0	0	1	60845
IND_SERVICES	0.426	0.495	0	0	0	1	1	60845

Note: Descriptive statistics for every variable included in this study, with N being the number of firm-year observations. The maximum amount of firm-year observations equals to 60845, as 12169 firms are included in the final sample times the number of years in the sample period. Statistics are based on data covering the years 2014 till 2018, though 2013 is used in the calculation of growth for the year 2014. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized. Besides age, the dummy variable stock listing and the dummies accounting for the different industries are not winsorized. For clarity, firm size and age are presented in their original form, whereas they are converted into a natural logarithm in the regression models. The industry abbreviations account for the following sectors in their respective order as above: agriculture, forestry and fishing; mining and construction; manufacturing; transport and communication; wholesale and retail; services.

4.2 Pearson's correlation matrix

This section discusses the Pearson's correlation matrix as seen in table 4. Due to the large number of variables included in this study, not all correlations will be discussed, but only the most important or noteworthy ones will be discussed. The correlation values range between -1 and +1 and indicate the strength of the relationship. When the correlations are statistically significant, a value below zero implies a negative relation between the variables, whereas a positive value indicates a positive relation. As a guideline, correlation values above .50 or .70 are often considered to be high and indicating strong relationships, while values below the aforementioned and above .30 indicate moderate relationships. In addition, correlations below .30 are considered to be small, while values below .10 imply weak relationships.

In line with Dasilas and Papasyriopoulos (2015), Degryse et al. (2012) and Matias and Serrasqueiro (2017), there is a fair amount of correlation between the dependent variables. For instance, the correlations on total debt (TD) with values of .399** for long-term debt (LTD) and .769** for short-term debt (STD) are to be expected, as the latter two both measure parts of the total debt measurement. Moreover, the negative and significant correlation (-.249**) between LTD and STD is also in line with the previously mentioned studies. Interestingly, compared to Dasilas and Papasyriopoulos (2015) these three correlations are very similar at .366**, .823** and -.226** respectively.

Besides the high correlation between dependent variables, the independent variable liquidity has high and significant correlations with TD (-.505**) and STD (-.529**). Interestingly, the correlation between liquidity and LTD is significant, but much smaller at -.045**. However, this is also to be expected as liquidity is measured based on current liabilities and current assets, therefore being less relevant for LTD. Moreover, a strong and negative relation is also expected as firms with high liquidity need less debt to finance their operations. With regard to tangibility, it could be seen that there is almost a moderate positive significant correlation (.294**) with LTD, which is expected as tangible firms face less issues when they are acquiring long-term debt due to the collateral they can offer. Besides, the negative moderate correlation (-.358**) between tangibility and STD shows that collateral is less important for acquiring STD, though this could be the result of the inclusion of creditors in the measurement of STD. Moreover, this pattern is in line with Dasilas and Papasyriopoulos (2015) and Degryse et al. (2012) who also find a positive and significant correlation with LTD and a negative significant correlation for STD. Another significant and moderate positive relation could be seen between non-debt tax shields (NDTS) and tangibility (.327**). This positive correlation makes sense as having more tangible assets also leads to higher NDTS, which are based on depreciation costs. However, the correlation between the two variables may lead to spurious

results. Therefore, as a robustness check two additional regressions are run, one with tangibility included and non-debt tax shields excluded and vice versa. This would test whether the relationships of the variables hold without each other.

Overall, there are a lot of significant correlations between the variables, although most of the significant correlations are moderate to small, with the majority of correlations being weak. However, the aforementioned correlation between tangibility and non-debt tax shields may imply a multicollinearity issue. To determine whether multicollinearity issues exist in the sample a VIF-test will be used, of which the outcome will be discussed in the next section.

Table 4: Pearson's correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 TD	1																		
2 LTD	.399**	1																	
3 STD	.769**	-.249**	1																
4 PROF (T-1)	-.218**	-.080**	-.159**	1															
5 SIZE (T-1)	.085**	-.009*	.114**	.078**	1														
6 TANG (T-1)	-.147**	.294**	-.358**	-0.004	-.165**	1													
7 GROW (T-1)	.061**	-0.006	.072**	.109**	-.036**	-.062**	1												
8 TAX (T-1)	-.047**	-.049**	-0.005	.121**	.025**	.017**	0.001	1											
9 NDTS (T-1)	.152**	.201**	.021**	.136**	0.000	.327**	-.133**	-.016**	1										
10 RISK (T-1)	.136**	.010*	.116**	-0.001	-.191**	-.031**	.082**	-.068**	.106**	1									
11 LIQ (T-1)	-.505**	-.045**	-.529**	.063**	-.129**	-.092**	-.044**	-.024**	-.207**	-.009*	1								
12 LIST	-.048**	.063**	-.096**	-.076**	.105**	-.027**	.016**	-.045**	.055**	.041**	.020**	1							
13 AGE (T-1)	-.156**	-.130**	-.073**	-.024**	.184**	-.057**	-.202**	0.004	-.068**	-.264**	.063**	-0.001	1						
14 AGRIFORFISH	-.046**	.024**	-.065**	.011*	-.020**	.071**	0.003	.012*	.018**	-.021**	.019**	-0.004	.037**	1					
15 MINCON	.020**	-.026**	.043**	-.009*	0.001	-.092**	.032**	.019**	-.070**	.016**	-.009*	.032**	.016**	-.039**	1				
16 MANU	-.080**	-.039**	-.054**	.038**	.066**	-.038**	-.058**	-.034**	.053**	-.055**	.058**	.051**	.176**	-.060**	-.162**	1			
17 TRANSCOMM	.057**	.016**	.051**	0.007	.051**	.028**	-.013**	-0.009	.099**	-.026**	-.068**	.011**	.044**	-.032**	-.087**	-.132**	1		
18 WHOLERETAIL	.033**	-.075**	.092**	-.023**	.125**	-.090**	-.020**	.059**	-.076**	-.117**	-.057**	-.043**	.064**	-.060**	-.163**	-.248**	-.132**	1	
19 SERVICES	.009*	.095**	-.067**	-.014**	-.181**	.129**	.051**	-.031**	0.005	.151**	.034**	-.030**	-.236**	-.104**	-.282**	-.428**	-.229**	-.431**	1

*Note: Variable names are abbreviated for presentation purposes, check tables 2 and 3 for the normal presentation of variables. All independent- and control- (except dummy) variables are lagged to avoid reverse causality. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized.**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).*

4.3 Assumptions

Before running the regression models, it is critical to verify the assumptions as mentioned in chapter 3.2.1 to be able to establish meaningful results. To be specific, Henseler (2019) preferred an observations to variables ratio of 15 or 20 to ensure that the sample size is large enough. This study has 19 variables (excluding the year dummy variables) and a minimum of 1094 observations (listed subsample table 8) and a maximum of 60.845 observations, which means that small sample size issues are non-existent. In addition, any influential observations are eliminated by winsorization as described in chapter 3.6 and chapter 4.1, therefore, outliers are not a problem either.

Where the previous assumptions apply to regression models in general, the following are specific to OLS regressions. The outcomes of the assumptions tests can be found in appendix II. In addition, it is worthy to note that only visually different outcomes are presented in appendix II, resulting in 10 pages of tests instead of 26 (which is the total amount of regressions ran), although all outcomes are checked. With regard to linearity, the regression model specified in chapter 3.3 is linear as it has a constant and each coefficient (parameter) is multiplied by an independent variable. Besides, linearity is also checked by looking at the P-P plots in appendix II. Based on this, linearity is assumed although the long-term debt models show some deviation that needs to be kept in mind. Similarly, the normal probability plots also account for the distribution of the error terms. Therefore, it could be concluded that the distributions of the total-debt ratio and short-term debt ratio are normal, while the distribution for long-term debt is not. However, as stated earlier in chapter 3.2.1, a violation can be ignored based on the Central Limit Theorem (N>200) as the sample size in this study is large enough (Henseler, 2019).

Homoscedasticity is tested by looking at the scatterplots with the standardized residuals and predicted values. When looking at the scatterplots, it could be seen that due to high winsorization the residuals appear to be more equal, as well as due to the large sample size. However, when looking at outcomes belonging to table 8 (listed firms only, thus smaller sample size), the residuals appear to be more randomly spread. Based on this I assume that heteroscedasticity is not an issue. To improve robustness, a fully logarithmic regression model is run (Hair et al., 2014), in which every variable is converted into a natural logarithm (if they were not converted already, e.g. firm size and age). To be able to test for multicollinearity a Variance Inflation Factor (VIF) test has been run on all independent variables (control variables are also independent variables) incorporated in this study. As seen in appendix II, all VIF values are below 2, thus well below the threshold of 5, indicating that multicollinearity is not an issue. To be specific, the correlation found between tangibility and non-debt tax shields does not appear to be problematic regarding multicollinearity, however, the proposed robustness check as discussed in chapter 4.2 will still be run.

4.4 Regression results

This section discusses the regression results of the regression model as described in chapter 3.3. In addition, the results are categorized based on the hypotheses formed in chapter 2.4. Each table in this section is split into two models, where the first discusses the full regression model, whereas in the latter the control variables are omitted. Besides, the results of the latter will not be discussed unless significantly different results are found between models 1 and 2. Moreover, each table presents a different dependent variable. The total debt-, long-term debt- and short-term debt ratios are presented in tables 5, 6 and 7 respectively. Due to the fact that not every variable is scaled to total assets, results are discussed based on standardized coefficients to improve comparability between variables. Probability values are not explicitly mentioned unless they are larger than 0.01, as the majority of p-values are smaller than <0.01. In addition, the standard errors reported can be considered small. Therefore, they are assumed not to be problematic in the interpretation of the results.

After comparing the outcomes of profitability across all three dependent variables, it could be seen that profitability has a negative and statistically significant effect on leverage across all models, confirming hypothesis 1 that profitability leads to lower leverage. In addition, when looking at the standardized beta's (-0.244, -0.122 and -0.156 for TD, LTD and STD respectively) it could be seen that they are also practically significant as the effect of the standardized coefficient is quite large. Besides, the effect found for STD is slightly larger than LTD, suggesting that profitability especially leads to lower use of short-term debt, however the difference between the two is not that large, so it is difficult to say with certainty that profitability is more important for STD than LTD. More importantly, the results imply that firms prefer to use internal financing over external financing, therefore supporting the pecking-order theory. The results found in this study are in line with Li and Islam (2019), Kayo and Kimura (2011), Matias and Serrasqueiro (2017) and de Jong et al. (2008) who also find negative and significant relationships for profitability.

With regard to firm size, all models support hypothesis 2 that size has a positive and statistically significant effect on leverage. This implies that larger firms use more debt than smaller firms. Based on the negative correlation found in table 4 between firm size and risk, support can be found for the trade-off theory, as larger firms are less risky and thus are better able to acquire and maintain higher leverage degrees (de Haan & Hinloopen, 2003; Serghiescu & Văidean, 2014). However, when considering the (standardized) betas it could be seen that the effect is rather small, although firm size appears to be a more important determinant of long-term debt than short-term debt. Therefore, it appears that firm size is not practically significant in relation to short-term debt considering the size of the effect. This outcome is in line with studies such as Dasilas and

Papasyriopoulos (2015), Degryse et al. (2012) and Li and Islam (2019) who all find similar small significant positive relationships for firm size.

While the previous variables showed consistent relations between the independent variables and dependent variables, this is not the case for tangibility. To be specific, table 6 reports a positive and statically significant relationship with LTD (standardized beta of 0.344), therefore supporting hypothesis 3 that tangibility leads to higher leverage. This implies that tangible firms face less problems in acquiring debt, therefore resulting in higher leverage. In addition, such a high-

Table 5: Regression model based on Total Debt

	Exp. sign	Model 1: Full model TD			Model 2: Without control var.		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
Constant		0.625***		0.020	0.636***		0.019
Profitability	-	-0.599***	-0.244	0.010	-0.594***	-0.242	0.010
Firm size	+	0.017***	0.066	0.001	0.012***	0.046	0.001
Tangibility	+	-0.185***	-0.148	0.006	-0.201***	-0.160	0.006
Growth	+/-	0.031***	0.029	0.004	0.053***	0.049	0.004
Tax shields	+	-0.042***	-0.025	0.007	-0.042***	-0.025	0.007
Non-debt tax shields	-	1.022***	0.113	0.043	1.138***	0.126	0.043
Risk	-	0.346***	0.110	0.013	0.397***	0.127	0.013
Liquidity	-	-0.091***	-0.499	0.001	-0.095***	-0.519	0.001
Stock listing	-	-0.165***	-0.096	0.007	-0.162***	-0.096	0.007
Age		-0.035***	-0.106	0.001	x	x	x
Industry dummy		Included			Omitted		
Year dummy		Included			Omitted		
F-statistic		1342.184***			2622.023***		
N		36702			36760		
Adj. R^2		0.410			0.391		

*Note: this table reports the OLS-regressions for the dependent variable Total Debt, where model 1 reports the full model, while control variables are omitted in model 2. Variable measurements can be found in chapter 3.4. A specification of the regression model is found in chapter 3.3. All independent- and control- (except dummy) variables are lagged to avoid reverse causality. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized. *** indicates significance at the 0.01 level. ** indicates significance at the 0.05 level. * indicates significance at the 0.1 level.*

standardized beta can also be considered practically significant. On the contrary, when looking at table 5 and 7, it could be seen that these relationships are negative and significant, thus implying a rejection of hypothesis 3. However, as stated in chapter 2.4.3 tangible assets are often used as collateral to obtain loans (LTD), whereas they are not- or most often not required to obtain STD, such as trade credit. Besides, this is also the case for TD as it merely consists of STD as seen in chapter 4.1. Therefore, hypothesis 3 is confirmed based on LTD, as TD and STD are less relevant with regard to tangibility. These results are in line with previous work, such as Dasilas and Papasyriopoulos (2015), Degryse et al. (2012) and Matias and Serrasqueiro (2017), who all find positive relationships with LTD and negative relationships with STD. However, the negative coefficient found for TD in this study differs from previous research, although that might be the result of the dominance of STD (r=0.769***) in TD.

As described in chapter 2.4.4 there are two hypotheses regarding growth, due to very mixed results in previous research. As seen in table 5, 6 and 7, all models show a positive and significant relationship between growth and leverage, confirming hypothesis 4a that growth has a positive effect, and therefore rejecting the negative hypothesized effect of hypothesis 4b. The positive effect found is in line with the pecking-order theory in the sense that high growth firms have to make large investments to facilitate this growth, therefore running out of retained earnings, resulting in the use of more leverage. However, the size of the effect of growth is rather small compared to other independent variables in this study. Therefore, practical significance is difficult to establish. Similarly, Degryse et al. (2012) also find small significant effects for TD (0.024*) and LTD (0.022*), although no significant result is found for STD. However, Matias and Serrasqueiro (2017) and Abdou et al. (2012) do not find any significant results regarding assets growth.

Based on the trade-off theory a positive relationship is to be expected between tax shields and leverage. This hypothesis is based on the fact that interest payments on debt are tax-deductible, therefore, theoretically implying that firms would use as much debt as possible. However, the evidence presented in tables 5 and 6 rejects hypothesis 5, as negative and statistically significant relationships are found. On the contrary, the results in table 7 show a small positive-, though insignificant relationship. This insignificance makes sense, as STD largely consists of trade credit which is a non-interest bearing liability. In earlier work, Degryse et al. (2012) also find a negative relationship for TD and LTD, while they find a positive significant relationship with STD. They give a possible explanation for this outcome in the sense that taxes are the result of high profitability, leading to lower leverage. Besides Degryse et al. (2012), Moradi and Paulet (2019) and Frank and Goyal (2009) also find negative significant relationships, whereas Acedo-Ramírez and Ruiz-Cabestre (2014) finds a positive relationship. As mentioned in chapter 2.4.5, the evidence for tax shields is rather ambiguous and is therefore more difficult to interpret. Overall, with the previous in mind and

when looking at the (standardized) coefficients, tax shields are assumed to be practically insignificant.

As described in chapter 2.4.5, non-debt tax shields (NDTS) can be considered as a substitute for the tax benefits of issuing debt, implying a negative relationship. Surprisingly, all models in table 5, 6 and 7 show a positive significant relationship between NDTS and leverage, therefore rejecting hypothesis 6. This outcome contradicts with earlier work that mostly finds negative- or insignificant relationships, however, there are some studies that also found positive significant relationships (Abdou et al., 2012; Frank & Goyal, 2009; Moradi & Paulet, 2019). A possible explanation for this positive relationship can be: to have high depreciation costs, firms need to possess a large amount of- or highly valued depreciable assets. These assets need to be financed, often resulting in higher leverage. Similarly, Abdou et al. (2012) explains that high depreciation costs are the result of a high amount of assets, which can be used as collateral, therefore making it easier to issue debt, resulting in higher leverage. This makes sense as high depreciation costs are often the result of high tangibility, a fact that is confirmed by the correlation between NDTS and tangibility (r. = .327***), as seen in chapter 4.2. With this potential explanation and the (standardized) betas in mind, practical significance could be established. However, as mentioned in chapter 4.2, an additional robustness check will be run to see whether the correlation influences the results.

With regard to risk, a negative relationship is expected based on the trade-off theory. Alternatively, the agency theory predicts a positive relationship as described in chapter 2.4.6. When looking at table 5 and 7, it could be seen that risk shows a positive significant relationship (std. betas of 0.110 and 0.104 respectively) with TD and STD. On the contrary, model 1 in table 6 shows a small negative but significant relationship with LTD, whereas model 2 presents another small but positive ($p<0.05$) relation. Based on this, hypothesis 7 can be rejected as the positive relationships found for TD and STD are much stronger than the relationship with LTD. In line with Michaelas et al. (1999) and Moradi and Paulet (2019), the outcomes found in this study support the agency theory that shareholders would pass the risk on to lenders, rather than investing their own money in risky projects. Overall, the results show that risky firms use more short-term debt to finance their operations, while the negative relation with long-term debt cannot be deemed practically significant.

Based on the standardized coefficients in table 5 and 7 it could be seen that liquidity is practically significant, as it is the most important determinant of TD (-0.499) and STD (-0.579), although this is not the case for LTD (0.047) as seen in table 6. However, this is to be expected as liquidity is measured based on current assets and liabilities. Therefore, the relationship between liquidity and LTD is weak. As a result, hypothesis 8 is confirmed based on TD and STD that high liquidity leads to lower leverage, supporting the pecking-order theory. This result is in line with Abdou et al. (2012), Cole (2013) and Ozkan (2001).

Table 6: Regression model based on Long-term Debt

	Exp. sign	Model 1: Full model LTD			Model 2: Without control var.		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
Constant		-0.103***		0.014	-0.107***		0.014
Profitability	-	-0.182***	-0.122	0.007	-0.177***	-0.118	0.007
Firm size	+	0.014***	0.088	0.001	0.009***	0.060	0.001
Tangibility	+	0.262***	0.344	0.004	0.253***	0.331	0.004
Growth	+/-	0.017***	0.025	0.003	0.032***	0.049	0.003
Tax shields	+	-0.033***	-0.033	0.005	-0.033***	-0.033	0.005
Non-debt tax shields	-	0.516***	0.094	0.031	0.618***	0.112	0.031
Risk	-	-0.027***	-0.014	0.010	0.022**	0.012	0.010
Liquidity	-	0.005***	0.047	0.001	0.003***	0.028	0.001
Stock listing	-	0.055***	0.053	0.005	0.064***	0.063	0.005
Age		-0.026***	-0.129	0.001	x	x	x
Industry dummy		Included			Omitted		
Year dummy		Included			Omitted		
F-statistic		442.466***			782.771***		
N		36704			36762		
Adj. R^2		0.186			0.161		

*Note: this table reports the OLS-regressions for the dependent variable Long-term Debt, where model 1 reports the full model, while control variables are omitted in model 2. Variable measurements can be found in chapter 3.4. A specification of the regression model is found in chapter 3.3. All independent- and control- (except dummy) variables are lagged to avoid reverse causality. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized.*** indicates significance at the 0.01 level. ** indicates significance at the 0.05 level. * indicates significance at the 0.1 level.*

As described in chapter 2.4.8, stock listed firms are expected to be less levered than unlisted firms due to easier access to equity financing. In this study, this negative and significant relationship is found for TD (-0.096) and STD (-0.136), while a positive significant coefficient is found for LTD (0.053). This implies that listed firms use less short-term debt, as well as debt in general, therefore supporting the pecking-order theory. However, listed firms do use slightly more long-term debt than their unlisted counterparts. Overall, hypothesis 8 is confirmed as TD and STD are both negative and show stronger relationships than LTD does. In addition, the mainly negative relationship found in this study is in line with Brav (2009), Schoubben and Van Hulle (2004) and Jõeveer (2013b). To conclude,

due to the inconsistent direction of the relationships between stock listing and the dependent variables, it is more difficult to establish practical significance, however, I still expect practical significance based on TD and STD.

Besides the hypothesized independent variables, there are also other independent variables included serving as control variables, which should also be checked. Note that this only applies to model 1 of each table as in model 2 all control variables are omitted. As seen in table 5, 6 and 7, firm age has a negative and significant relationship across all dependent variables, implying that older firms use less debt. Besides, this negative effect is stronger for TD (-0.106) and LTD (-0.129) than for STD (-0.021). This is in line with Mc Namara et al. (2017) who find similar negative relationships for TD, LTD and STD. In addition, the results support the pecking-order theory that older firms have more opportunities (because they are in business longer) to stockpile retained earnings, therefore lowering the need for external financing (Dasilas & Papasyriopoulos, 2015; Mc Namara et al., 2017).

Regarding the different industries accounted for in the sample, all dummy variables are highly significant (industry coefficients are not reported in the tables above) except for the agriculture, forestry and fishing industry in the LTD model which is significant at the <.10 level. In addition, the agriculture, forestry and fishing industry uses less total- and short-term debt compared to other industries, whereas the wholesale and retail industry uses less long-term debt. After checking the unreported year dummies, it could be concluded that there are no practically significant differences between leverage levels over the years, as the majority of dummies are highly insignificant. When comparing the relationships (direction and magnitude) in model 1 versus model 2 across tables 5, 6 and 7, consistent results are found. However, there are two exceptions. First, the relationship between risk and LTD changes direction (-0.027*** vs 0.022**) in table 6. However, as the effect is already very weak, this change is not considered significant. Second, the effect of NDTS on LTD (0.516*** vs 0.618***) in table 6 increases significantly. As seen in table 4, this effect is presumably caused by the negative correlation between NDTS and age, as well as some industries, leading to a stronger effect after the control variables are omitted.

When looking at the adj. R^2-values it could be seen that the models in table 5 and 7 explain a moderate amount of variation in TD (0.410) and STD (0.489), while the explained variance in LTD (0.186) is lower for the model in table 6. Based on the differences in adj. R^2 between models 1 and 2 across the tables, it could be concluded that including the control variables in the model slightly helps to explain some additional variance (adj. R^2 increase of 0.019, 0.025 and 0.003 for TD, LTD and STD respectively). Compared to other studies, Dasilas and Papasyriopoulos (2015) and Degryse et al. (2012) explain lower variance in their TD (0.351 and 0.202 respectively) and STD models (0.280 and 0.156 respectively) than this study, though their LTD models explain more variance (0.303 and 0.422 respectively). On the contrary, Bevan and Danbolt (2002,2004) find lower R^2 values at around 0.13. In

addition, the model of Li and Islam (2019) explains even less variance at 0.09, though this might be the result of using a small number of independent variables.

Table 7: Regression model based on Short-term Debt

	Exp. sign	Model 1: Full model STD			Model 2: Without control var.		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
Constant		0.716***		0.017	0.727***		0.016
Profitability	-	-0.351***	-0.156	0.009	-0.353***	-0.157	0.009
Firm size	+	0.003***	0.015	0.001	0.003***	0.013	0.001
Tangibility	+	-0.444***	-0.386	0.005	-0.449***	-0.390	0.005
Growth	+/-	0.017***	0.017	0.004	0.021***	0.021	0.004
Tax shields	+	0.002	0.001	0.006	0.003	0.002	0.006
Non-debt tax shields	-	0.375***	0.045	0.037	0.377***	0.045	0.036
Risk	-	0.299***	0.104	0.011	0.297***	0.104	0.011
Liquidity	-	-0.097***	-0.579	0.001	-0.098***	-0.586	0.001
Stock listing	-	-0.214***	-0.136	0.006	-0.221***	-0.143	0.006
Age		-0.006***	-0.021	0.001	x	x	x
Industry dummy		Included			Omitted		
Year dummy		Included			Omitted		
F-statistic		1852.620***			3861.599***		
N		36702			36760		
Adj. R^2		0.489			0.486		

*Note: this table reports the OLS-regressions for the dependent variable Short-term Debt, where model 1 reports the full model, while control variables are omitted in model 2. Variable measurements can be found in chapter 3.4. A specification of the regression model is found in chapter 3.3. All independent- and control- (except dummy) variables are lagged to avoid reverse causality. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized. *** indicates significance at the 0.01 level. ** indicates significance at the 0.05 level. * indicates significance at the 0.1 level.*

4.5 Robustness checks

This section presents some additional robustness checks to test whether the results found in the previous section remain robust. First, due to the dominance of unlisted firms in the sample as described in chapter 4.1, a split sample regression is run on listed and unlisted firms which is similar to Schoubben and Van Hulle (2004). Second, due to the high correlations between the services

industry and several other industries, as well as the dominance of the services industry in the sample, another sample split regression is run, splitting the services industry and the other industries. Third, chapter 4.3 assumed that heteroscedasticity is not an issue, however, to improve robustness another regression is ran in which every variable is converted into a logarithm (Hair et al., 2014). Fourth, as described in chapter 4.1 the maximum value found for TD and STD exceeded 1, implying negative equity. Therefore, as a robustness check a regression model will be ran that excludes firms with debt ratios above 1. Finally, as seen in chapter 4.2 there is a moderate amount of correlation between tangibility and non-debt tax shields. In order to see whether the aforementioned variables remain significant and robust without each other, an additional robustness check is run based on two models: one with tangibility included and NDTS omitted and the other with tangibility omitted and NDTS included.

As mentioned, the first robustness check splits the sample into listed and unlisted firms and can be found in appendix I table 8. Potentially due to the smaller N of the stock listed firms in subsample A, several changes occur compared to the main results as found in section 4.4. For instance, size becomes more important for TD and LTD, while it turns insignificant for STD. Tangibility turns insignificant in the TD model, while it remains robust in the other models. Growth and tax shields -if not already- turn insignificant in all three models, though this is to be expected due to the small effect found in the main results. Similarly, NDTS also turn insignificant for TD and LTD, whereas it only holds significance in the STD model at p-value <0.10. The coefficient accounting for risk changes direction into a positive relation in the LTD model, though the effect is very small as well as being barely significant (p <.10). In addition, in the LTD model, liquidity changes direction into a negative relationship (in line with the hypothesis, Std. Beta -0.143), while this was positive in table 6 with a small effect. Age does not remain robust in the smaller listed sample. Moreover, the adjusted R^2 changed significantly between models as it dropped to 0.287 and 0.315 for TD and STD respectively. On the contrary, the LTD model explained slightly more variance at 0.215. Overall, the most important determinants as found in the previous section, such as profitability, tangibility and liquidity remain robust (with minor exceptions in mind as described above) in the listed firm subsample. With regard to subsample B that only includes the unlisted firms, it could be seen that the results remain robust. However, this is to be expected due to the dominance of unlisted firms in the full sample.

As seen in appendix I table 9, the second robustness check splits the sample into subsample A, which only includes firms in the services industry, and subsample B that includes all other firms excluding the services industry. In subsample A, growth loses significance (p <0.05) in relation to TD, while it turns insignificant with regard to LTD. In addition, risk turns insignificant in the LTD model, which is expected, as the effect although significant was not very strong in the main results either. In

the STD model, size and age turn insignificant. As expected, the results in subsample B remain robust, though there are some exceptions. In the LTD model, risk becomes less significant ($p < 0.05$), while this is also the case for growth in the STD model. Again, profitability, tangibility and liquidity are the most important determinants based on standardized betas, therefore remaining robust.

Table 10 in Appendix I presents the third robustness check that converts all variables in the models into logarithms. Overall, the majority of relationships remain robust with the following exceptions in mind. First, profitability appears to become slightly less important, while changing direction into a positive and significant coefficient (though very small) the STD model. Similar to previous models, tax shields do not remain robust as it for instance changes into a positive relation, although barely significant ($p < .10$). Likewise, growth turns insignificant in the LTD model, which is in line with the previous robustness checks. Interestingly, liquidity becomes more important in TD and STD models, while it changes direction into a small negative coefficient for LTD. However, as mentioned in section 4.4, liquidity is measured on current liabilities and current assets, therefore being irrelevant in relation to LTD. When comparing R^2 values between the main results and the logarithm models in table 10, it could be seen that explained variance increases in TD and LTD models (increase of .094 and .034 respectively), while remaining similar in the STD model.

Table 11 presents the fourth robustness check that caps the dependent variables at a maximum value of 1, implying that firms with negative equity are removed from the sample. As described in the descriptive statistics in chapter 4.1, similar maximum debt ratios exceeding 1 are found in other studies such as Cole (2013) and Degryse et al. (2012). Besides, Dasilas and Papasyriopoulos (2015) and Mc Namara et al. (2017) even report much larger values than found in this study, while most other studies do not even report the minimum and maximum values. Therefore, to improve robustness this study eliminated all negative equity firms. In general, the results across table 11 remain robust, although there are some exceptions similar to previous robustness checks. For instance, in the TD model tax shields changes direction into a positive effect ($p < 0.05$), although being very small. Similarly, risk turns into a negative effect that is also negligible based on the standardized coefficient. In the LTD model, tax shields turn insignificant, whereas it becomes significant in the STD model. However, yet again this relationship only has a minor effect, therefore being negligible. Surprisingly, risk loses quite a lot of importance in the STD model going from a std. B of 0.104*** in the main results to a value of 0.020*** after removing negative equity firms. This makes sense as firms with negative equity are very risky, therefore they use more (short-term) debt to pass their risk onto lenders, resulting in a lower coefficient for risk after removing negative equity firms.

Table 12 presents the final robustness check that tests whether the results for tangibility and NDTS remain robust when the variables are tested separately, due to the correlation between the

two variables. For comparison purposes, model 1 presents the reference model as found in table 6. In model 2 tangibility is omitted, whereas NDTS is omitted in model 3. As mentioned in chapter 4.4, tangibility is important for LTD as fixed assets are often used as collateral to obtain LTD, whereas this is more often irrelevant for STD due to the inclusion of trade credit. Besides, NDTS is based on depreciation costs that mainly arise due to the depreciation of fixed assets, which in turn are often financed with LTD. Therefore, all models in table 12 use LTD as the dependent variable. As seen in model 2, after omitting tangibility the result for NDTS remains positive and significant. In addition, the standardized beta for NDTS rises from 0.094 in model 1 to 0.240 in model 2. This implies that after removing tangibility, NDTS is the most important determinant of LTD. However, the adjusted R^2 value drops from 0.186 in model 1 to 0.098 in model 2, implying that after omitting tangibility the model explains 8.8% less variation in leverage, which can be considered as quite a large decrease of explanatory power. On the contrary, after omitting NDTS the results for tangibility remain robust as the relationship remains positive and significant as seen in model 3. Besides, the standardized beta becomes slightly more important (0.344 in model 1 to 0.382 in model 3), although this increase is much smaller compared to the increase found in model 2. Interestingly, after omitting NDTS the adjusted R^2 only drops by 0.6% compared to model 1. Overall, this indicates that the results for tangibility remain robust, while the results for NDTS appear to be somewhat spurious. Therefore, the results for NDTS must be interpreted with caution.

After running these robustness checks a pattern becomes apparent that variables that have low standardized betas (although being significant) in the main results often become insignificant or change direction when sample size decreases in sample splits. Similarly, the (most) important variables based on moderate- to high standardized betas generally remain robust across robustness checks.

5. Conclusion

This final chapter is aimed at drawing conclusions based on the research. First, the main findings will be discussed in order to answer the research question as formed in the introduction. Second, any limitations of this study will be critically considered and discussed. Finally, based on this research several avenues for future research will be addressed.

5.1 Main findings

This study has tested the impact of a relatively large amount of firm-specific determinants on capital structure for UK firms over the period 2014 till 2018. The main objective of this research is to see to what extent these firm-specific determinants explain the usage of leverage in UK firms. This has led to the following research question: "*To what extent do the firm-specific determinants of capital structure explain the degree of leverage used in UK firms?".* Based on the results, the research question can be answered as follows: the firm-specific determinants included in this study help to explain a moderate amount of variation in leverage in UK firms. A moderate amount might not sound very appealing. However, this study found higher explanatory power in most models compared to other studies on firm-specific determinants of capital structure such as Brav (2009), Dasilas and Papasyriopoulos (2015) and Li and Islam (2019).

The firm-specific determinants used in this study are selected based on earlier work and tested across several ordinary least squares (OLS) regression models. The most important firm-specific determinants based on the strength of the effect are profitability, tangibility and liquidity. Interestingly, while profitability has a negative effect on all three measures of leverage, this consistent relationship is not the case for tangibility and liquidity. Tangibility has a positive effect on long-term debt, while it has a negative effect on short-term and total debt. These inconsistencies can be best explained by the fact that tangible firms face less issues in the attempt to acquire long-term debt, while tangibility is not of importance for acquiring short-term debt that mainly consists of trade credit, which does not require collateral. Similarly, liquidity is only practically significant in relation to short-term debt (as a result, also to total debt), due to the short-term character of liquidity of being able to fulfill a firm's short-term liabilities. Overall, across these three most important determinants of leverage, the pecking order theory appears to fit the best in explaining capital structure decisions of UK firms.

Besides the three aforementioned most important determinants, there are also other firm-specific determinants that are of importance. With regard to the total debt ratio, non-debt tax shields (+), stock listing (-) and age (-) are of practical significance. In addition, when considering the

long-term debt ratio, firm size (+), non-debt tax shields (+) and age (-) are of importance. Also, in relation to the short-term debt ratio, non-debt tax shields (+), risk (+) and stock listing (-) show practically significant relationships. Overall, these determinants helped to explain the degree of leverage used in UK firms, although they cannot be considered as highly important. On a critical note, the results regarding non-debt tax shields appear consistent across models, however, after omitting tangibility the relationship between non-debt tax shields and leverage becomes spurious. Therefore, the results based on non-debt tax shields should be interpreted with caution. The key take-away based on the difference between listed- and unlisted firms is that the main results as discussed before hold, although firm size appears to be another important determinant of leverage for listed firms. However, while both listed- and unlisted firms are included in this study, it has never been the main objective to compare the differences between the two. Therefore, no statistical tests have been run to test whether these differences are statistically significant. Finally, no convincing evidence was found to establish practical significance for growth and tax shields. However, this is in line with earlier work that also found mixed results regarding tax shields and growth.

In the end, this study has contributed by providing an up-to-date view of to what extent firm-specific determinants help to explain the degree of leverage used in UK firms. By using a large dataset of 12169 firms over the period 2014 till 2018 and a relatively large amount of determinants, this study has shown that multiple determinants such as non-debt tax shields, firm size, risk, stock listing and age have a significant effect on leverage, though the most important determinants of capital structure for UK firms are profitability, tangibility and liquidity. From a practical perspective, I hope this study helps current- and future managers to better understand their firm's capital structure based on recent evidence.

5.2 Limitations

After a critical reflection on this study, several implications can be made. First, in the calculation of the dependent variables, liabilities are used instead of debt. As explained earlier in this study, the database used e.g. defines non-current liabilities as the sum of long-term debt and other long-term liabilities. This implies that besides debt other liabilities such as long-term lease liabilities are also included in the measurement. Preferably, only liabilities that are considered to be debt would be used, however, the database did not provide sufficient data in order to use this measurement. On the other hand, some of these other liabilities can also be considered as a way of financing operations, therefore it might even be beneficial in the explanation of capital structure. In addition, according to the database's manual all measures are widely tested and verified, therefore I do not expect these differences to be problematic, however, it is important to keep them in mind when interpreting the results.

Second, the inclusion of trade credit in the measurement of short-term debt (current liabilities) may lead to biased results on total- and short term debt as trade credit appears to be a very dominant factor within short-term debt. As a result, when large effects are found in the short-term debt model, this often resulted in a similar effect in the total debt model as predicted by de Jong et al. (2008). Similar to the previous paragraph, the database did not provide sufficient data when selecting short-term debt, while it did based on current liabilities. On the contrary, trade credit can be considered as the most important financing method for day-to-day operations, so it cannot be fully neglected in capital structure studies either.

Third, due to the large sample size in this study, the majority of correlations and relationships are statistically significant based on the p-values found (most at $p < 0.01$). This phenomenon is also referred to as large sample size fallacy (Lantz, 2013). As a result, interpretation of results is more difficult based on p-values, therefore practical significance has to be established based on the size of the effect (under the condition that the relationship is statistically significant). However, as seen in the results chapter, practical significance has been considered based on standardized coefficients. Therefore, this should not be an issue, although the tables need to be read and analyzed with care.

Fourth, to control for the differences between industries, firms are assigned to a certain industry classification based on SIC-codes. This study uses the same industry classifications as Dasilas and Papasyriopoulos (2015), however the distribution of firms across industries in this study cannot be considered equal, while it is more equal in the study of Dasilas and Papasyriopoulos (2015). As seen in the descriptive statistics, the industry accounting for agriculture, forestry and fishing is underrepresented in the sample, while the services industry is very dominant with over 4 out of 10 firms in the sample belonging to the services industry. This issue has partly been dealt with by running a split sample robustness check that considered the services industry and the other industries separately. However, the underrepresentation of the agriculture, forestry and fishing industry has not been dealt with.

Fifth, risk is measured by the standard deviation of earnings before interest and taxes (EBIT) over the sample period and then scaled to total assets. Due to this measure, each firm in the sample only has one value for risk before being scaled to total assets. In relation to the empirical model as described in chapter 3.3, this can be seen as a limitation as the model accounts for firm-year observations (i,t), while the measure for risk only accounts for the firm-observations (i).

Sixth, due to the correlation between tangibility and non-debt tax shields, spurious results are found for non-debt tax shields after omitting tangibility from the model. Meanwhile, after omitting non-debt tax shields, the results on tangibility remained robust. Therefore, the results on non-debt tax shields should be carefully interpreted as mentioned before.

Finally, based on the scatterplots of the standardized residuals in Appendix II it is somewhat difficult to assess whether heteroscedasticity is an issue due to the large sample size in this study, as most scatterplots are mainly filled solid. Besides, due to the high winsorization used to eliminate outliers, it is even more difficult to assess. In order to attempt to resolve this issue, a robustness check with logarithmic variables is ran. However, it is still difficult to determine with certainty whether heteroscedasticity is not an issue and if it has impacted the results or not.

5.3 Avenues for future research

Based on this research and the aforementioned limitations, several recommendations can be made. For instance, future research on capital structure may include both liabilities and debt measurements to compare whether the results based on these variables of leverage are significantly different from each other. Besides, future research may test the impact of the inclusion of trade-credit in the measurement of short-term debt, as the inclusion of trade credit can also lead to different results in total debt ratios. For instance, it could be interesting to see how the results for the total debt ratio change after including or excluding trade credit in different regressions.

As described earlier, the regression model used in this study is very sensitive to large sample sizes, resulting in high statistical significance in almost every relationship. Future studies might make interpretation of results easier by including other regression methods that are less sensitive to large sample sizes, such as Generalized Method of Moments (GMM), though this would require a slightly different research model (e.g. usage of lagged dependent variable).

Although not apparent from the results of this study, but based on actuality, future studies could study the impact of Brexit on capital structure in UK firms. However, this would require a few years of additional data before being apparent or not. This does not necessarily appear relevant based on firm-specific determinants, but institutional settings such as country-specific determinants are expected to be relevant. Similarly, it will be interesting to see whether the Covid-19 pandemic has a significant impact on capital structure, though again several years of additional data will be required. Based on my expectations I would predict a negative impact on the use of leverage, as I expect firms to be more cautious and hesitant in making large investments in these uncertain times, resulting in lower demand and use of leverage.

Appendix I: Robustness regression tables

Table 8: Regression model based on two subsamples: stock listed and unlisted firms

	Exp. sign	Model 1: TD			Model 2: LTD			Model 3: STD		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
	Subsample A: Stock listed firms									
Constant		-0.063		0.116	-0.420***		0.082	0.362***		0.076
Profitability	-	-0.535***	-0.236	0.078	-0.289***	-0.189	0.055	-0.255***	-0.168	0.051
Firm size	+	0.036***	0.223	0.006	0.034***	0.314	0.004	0.002	0.016	0.004
Tangibility	+	0.049	0.038	0.036	0.246***	0.287	0.025	-0.180***	-0.210	0.023
Growth	+/-	-0.005	-0.006	0.023	0.018	0.031	0.016	-0.018	-0.033	0.015
Tax shields	+	0.057	0.036	0.043	0.032	0.030	0.031	0.038	0.036	0.028
Non-debt tax shields	-	0.038	0.004	0.246	-0.202	-0.035	0.173	0.283*	0.049	0.162
Risk	-	0.401***	0.184	0.069	0.093*	0.063	0.048	0.252***	0.172	0.045
Liquidity	-	-0.061***	-0.420	0.004	-0.014***	-0.143	0.003	-0.048***	-0.491	0.003
Age		0.016**	0.064	0.008	0.004	0.026	0.005	0.009*	0.053	0.005
Industry dummy		Included			Included			Included		
Year dummy		Included			Included			Included		
F-statistic		25.423***			17.657***			28.870***		
N		1094			1094			1094		
Adj. R^2		0.287			0.215			0.315		

Table 8 (Continued): Regression model based on two subsamples: stock listed and unlisted firms

	Exp. sign	Model 1: TD			Model 2: LTD			Model 3: STD		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
	Subsample B: Unlisted firms									
Constant		0.684***		0.020	-0.063***		0.014	0.726***		0.017
Profitability	-	-0.616***	-0.250	0.010	-0.195***	-0.131	0.007	-0.351***	-0.155	0.009
Firm size	+	0.014***	0.054	0.001	0.012***	0.072	0.001	0.003***	0.013	0.001
Tangibility	+	-0.200***	-0.160	0.006	0.261***	0.345	0.004	-0.456***	-0.398	0.005
Growth	+/-	0.033***	0.030	0.005	0.018***	0.028	0.003	0.016***	0.016	0.004
Tax shields	+	-0.048***	-0.029	0.007	-0.038***	-0.038	0.005	0.001	0.001	0.006
Non-debt tax shields	-	1.120***	0.123	0.044	0.565***	0.103	0.031	0.412***	0.049	0.038
Risk	-	0.354***	0.111	0.014	-0.026***	-0.013	0.010	0.301***	0.103	0.012
Liquidity	-	-0.092***	-0.499	0.001	0.007***	0.060	0.001	-0.099***	-0.587	0.001
Age		-0.038***	-0.114	0.001	-0.028***	-0.139	0.001	-0.007***	-0.022	0.001
Industry dummy		Included			Included			Included		
Year dummy		Included			Included			Included		
F-statistic		1425.999***			454.366***			1901.583***		
N		35608			35610			35608		
Adj. R^2		0.419			0.186			0.490		

*Note: this table reports the OLS-regressions for all three dependent variables. Subsample A presents the results based on stock listed firms, while subsample B presents the results for unlisted firms. Variable measurements can be found in chapter 3.4. A specification of the regression model is found in chapter 3.3. All independent- and control- (except dummy) variables are lagged to avoid reverse causality. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized. *** indicates significance at the 0.01 level. ** indicates significance at the 0.05 level. * indicates significance at the 0.1 level.*

Table 9: Regression model based on two subsamples: services industry and all other industries excl. services

	Exp. sign	Model 1: TD			Model 2: LTD			Model 3: STD		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
	Subsample A: Services industry									
Constant		0.677***		0.039	-0.126***		0.028	0.788***		0.033
Profitability	-	-0.567***	-0.238	0.018	-0.159***	-0.102	0.013	-0.326***	-0.149	0.015
Firm size	+	0.019***	0.068	0.002	0.019***	0.104	0.002	-0.001	-0.003	0.002
Tangibility	+	-0.158***	-0.134	0.010	0.300***	0.388	0.007	-0.457***	-0.421	0.008
Growth	+/-	0.020**	0.019	0.008	-0.001	-0.002	0.006	0.025***	0.026	0.007
Tax shields	+	-0.067***	-0.040	0.013	-0.052***	-0.048	0.009	0.008	0.005	0.011
Non-debt tax shields	-	0.928***	0.100	0.077	0.427***	0.070	0.056	0.333***	0.039	0.064
Risk	-	0.346***	0.124	0.022	-0.024	-0.013	0.016	0.286***	0.111	0.019
Liquidity	-	-0.088***	-0.448	0.002	0.010***	0.075	0.001	-0.098***	-0.544	0.001
Stock listing	-	-0.257***	-0.136	0.014	0.031***	0.025	0.010	-0.271***	-0.156	0.012
Age		-0.049***	-0.129	0.003	-0.042***	-0.170	0.002	-0.001	-0.002	0.002
Industry dummy		Omitted			Omitted			Omitted		
Year dummy		Included			Included			Included		
F-statistic		449.750***			193.424***			699.124***		
N		11829			11830			11829		
Adj. R^2		0.347			0.185			0.452		

Table 9 (continued): Regression model based on two subsamples: services industry and all other industries excl. services

	Exp. sign	Model 1: TD			Model 2: LTD			Model 3: STD		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
	Subsample B: All industries excluding the services industry									
Constant		0.625***		0.022	-0.083***		0.015	0.692***		0.019
Profitability	-	-0.626***	-0.252	0.012	-0.206***	-0.144	0.009	-0.368***	-0.160	0.011
Firm size	+	0.016***	0.065	0.001	0.011***	0.080	0.001	0.005***	0.023	0.001
Tangibility	+	-0.214***	-0.165	0.007	0.230***	0.308	0.005	-0.440***	-0.367	0.006
Growth	+/-	0.041***	0.037	0.005	0.031***	0.049	0.004	0.012**	0.012	0.005
Tax shields	+	-0.025***	-0.015	0.008	-0.019***	-0.021	0.005	-0.001	-0.001	0.007
Non-debt tax shields	-	1.165***	0.132	0.053	0.644***	0.127	0.037	0.421***	0.052	0.046
Risk	-	0.346***	0.100	0.017	-0.024**	-0.012	0.012	0.307***	0.096	0.015
Liquidity	-	-0.094***	-0.538	0.001	0.003***	0.028	0.001	-0.097***	-0.602	0.001
Stock listing	-	-0.117***	-0.073	0.008	0.070***	0.075	0.005	-0.187***	-0.126	0.007
Age		-0.028***	-0.089	0.002	-0.018***	-0.099	0.001	-0.009***	-0.031	0.001
Industry dummy		Included (Services ind. omitted)			Included (Services ind. omitted)			Included (Services ind. omitted)		
Year dummy		Included			Included			Included		
F-statistic		1112.522***			307.814***			1468.004***		
N		24873			24874			24873		
Adj. R^2		0.446			0.182			0.515		

*Note: this table reports the OLS-regressions for all three dependent variables. Subsample A presents the results based on the services industry, while subsample B presents the results for all other industries. Variable measurements can be found in chapter 3.4. A specification of the regression model is found in chapter 3.3. All independent- and control- (except dummy) variables are lagged to avoid reverse causality. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized. *** indicates significance at the 0.01 level. ** indicates significance at the 0.05 level. * indicates significance at the 0.1 level.*

Table 10: Regression model with logarithmic variables

	Exp. sign	Model 1: TD			Model 2: LTD			Model 3: STD		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
Constant		-0.965***		0.045	-3.000***		0.211	-1.083***		0.056
Profitability	-	-0.049***	-0.073	0.004	-0.234***	-0.098	0.018	0.014***	0.017	0.005
Firm size	+	0.041***	0.080	0.003	0.057***	0.033	0.012	0.043***	0.069	0.003
Tangibility	+	-0.069***	-0.207	0.002	0.412***	0.330	0.011	-0.171***	-0.424	0.003
Growth	+/-	0.018***	0.040	0.002	0.001	0.001	0.011	0.028***	0.051	0.003
Tax shields	+	0.006*	0.009	0.003	-0.096***	-0.042	0.015	0.033***	0.042	0.004
Non-debt tax shields	-	0.040***	0.086	0.003	0.231***	0.135	0.016	0.073***	0.127	0.004
Risk	-	0.020***	0.034	0.003	-0.126***	-0.059	0.016	0.074***	0.100	0.004
Liquidity	-	-0.588***	-0.668	0.005	-0.148***	-0.049	0.022	-0.672***	-0.629	0.006
Stock listing	-	-0.252***	-0.068	0.018	1.155***	0.097	0.080	-0.619***	-0.138	0.022
Age		-0.045***	-0.068	0.003	-0.176***	-0.079	0.015	0.016***	0.020	0.004
Industry dummy		Included			Included			Included		
Year dummy		Included			Included			Included		
F-statistic		1178.214***			278.584***			1075.356***		
N		22027			18742			22027		
Adj. R^2		0.504			0.220			0.481		

*Note: this table reports the OLS-regressions for all three dependent variables. All variables are converted into natural logarithms to improve robustness. Variable measurements can be found in chapter 3.4. A specification of the regression model is found in chapter 3.3. All independent- and control- (except dummy) variables are lagged to avoid reverse causality. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized. *** indicates significance at the 0.01 level. ** indicates significance at the 0.05 level. * indicates significance at the 0.1 level.*

Table 11: Regression model with debt ratios capped at 1

	Exp. sign	Model 1: TD			Model 2: LTD			Model 3: STD		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
Constant		0.591***		0.016	-0.100***		0.012	0.688***		0.015
Profitability	-	-0.301***	-0.146	0.009	-0.109***	-0.082	0.007	-0.191***	-0.091	0.008
Firm size	+	0.016***	0.076	0.001	0.012***	0.086	0.001	0.005***	0.021	0.001
Tangibility	+	-0.159***	-0.157	0.005	0.277***	0.425	0.004	-0.438***	-0.426	0.005
Growth	+/-	0.038***	0.043	0.004	0.028***	0.049	0.003	0.010***	0.011	0.004
Tax shields	+	0.013**	0.009	0.006	-0.007	-0.008	0.004	0.020***	0.014	0.005
Non-debt tax shields	-	0.357***	0.047	0.037	0.243***	0.050	0.028	0.113***	0.015	0.035
Risk	-	-0.036***	-0.013	0.012	-0.093***	-0.052	0.009	0.058***	0.020	0.012
Liquidity	-	-0.085***	-0.581	0.001	0.004***	0.045	0.000	-0.090***	-0.604	0.001
Stock listing	-	-0.132***	-0.096	0.006	0.059***	0.067	0.004	-0.191***	-0.137	0.005
Age		-0.029***	-0.108	0.001	-0.018***	-0.104	0.001	-0.011***	-0.039	0.001
Industry dummy		Included			Included			Included		
Year dummy		Included			Included			Included		
F-statistic		1322.018***			525.525***			1834.307***		
N		34398			34398			34398		
Adj. R^2		0.422			0.225			0.503		

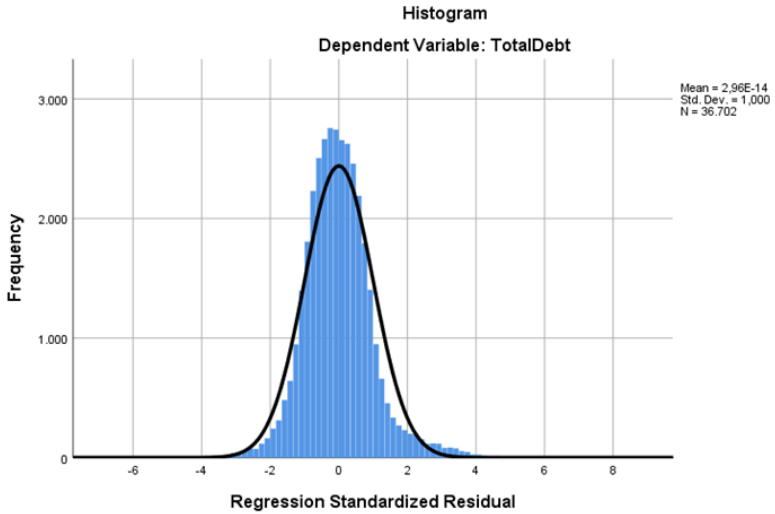
*Note: this table reports the OLS-regressions for all three dependent variables. Dependent variables are capped to a maximum value of 1 to improve robustness. Variable measurements can be found in chapter 3.4. A specification of the regression model is found in chapter 3.3. All independent- and control- (except dummy) variables are lagged to avoid reverse causality. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized. *** indicates significance at the 0.01 level. ** indicates significance at the 0.05 level. * indicates significance at the 0.1 level.*

Table 12: Regression model with tangibility and NDTS tested separately

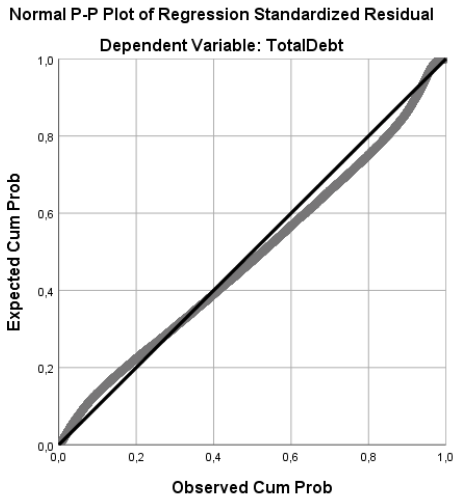
	Exp. sign	Model 1: Reference (table 6)			Model 2: Tangibility omitted			Model 3: NDTS omitted		
		Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error	Beta	Std. Beta	Std. Error
Constant		-0.103***		0.014	0.051***		0.014	-0.094***		0.014
Profitability	-	-0.182***	-0.122	0.007	-0.198***	-0.132	0.008	-0.157***	-0.105	0.007
Firm size	+	0.014***	0.088	0.001	0.007***	0.042	0.001	0.014***	0.090	0.001
Tangibility	+	0.262***	0.344	0.004	Omitted			**0.291*** **	**0.382**	**0.004**
Growth	+/-	0.017***	0.025	0.003	0.016***	0.025	0.003	0.008***	0.013	0.003
Tax shields	+	-0.033***	-0.033	0.005	-0.029***	-0.029	0.005	-0.035***	-0.035	0.005
Non-debt tax shields	-	0.516***	0.094	0.031	**1.320*** **	**0.240**	**0.030**	Omitted		
Risk	-	-0.027***	-0.014	0.010	-0.147***	-0.078	0.010	-0.002	-0.001	0.009
Liquidity	-	0.005***	0.047	0.001	0.000	0.002	0.001	0.004***	0.035	0.001
Stock listing	-	0.055***	0.053	0.005	0.052***	0.049	0.005	0.061***	0.059	0.005
Age		-0.026***	-0.129	0.001	-0.020***	-0.100	0.001	-0.028***	-0.138	0.001
Industry dummy		Included			Included			Included		
Year dummy		Included			Included			Included		
F-statistic		442.466***			221.983***			448.081***		
N		36704			36789			36704		
Adj. R^2		0.186			0.098			0.180		

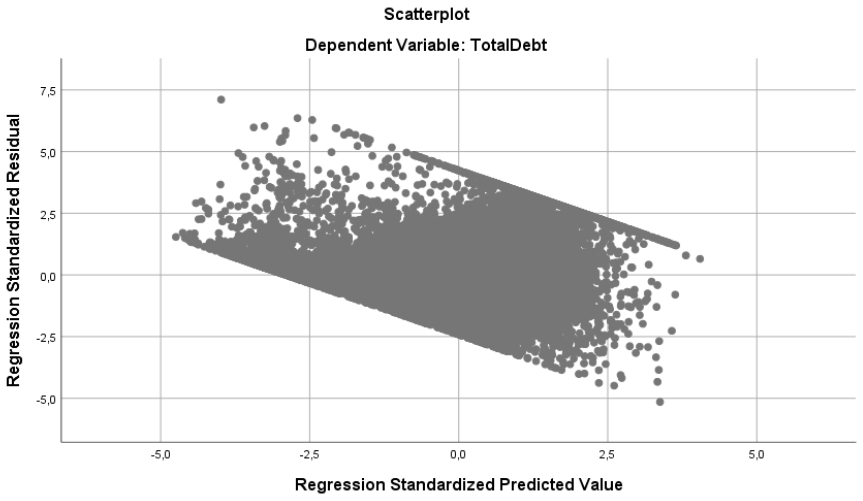
*Note: this table reports the OLS-regressions only based on the long-term debt ratio. Model 1 presents the reference model as found in table 6 in chapter 4.4. Model 2 presents the model with tangibility omitted and in model 3 NDTS is omitted. Variable measurements can be found in chapter 3.4. A specification of the regression model is found in chapter 3.3. All independent- and control- (except dummy) variables are lagged to avoid reverse causality. All metric variables except age are winsorized at the 5% percent level, meaning that the lower- and upper 2.5% percentiles are winsorized. *** indicates significance at the 0.01 level. ** indicates significance at the 0.05 level. * indicates significance at the 0.1 level.*

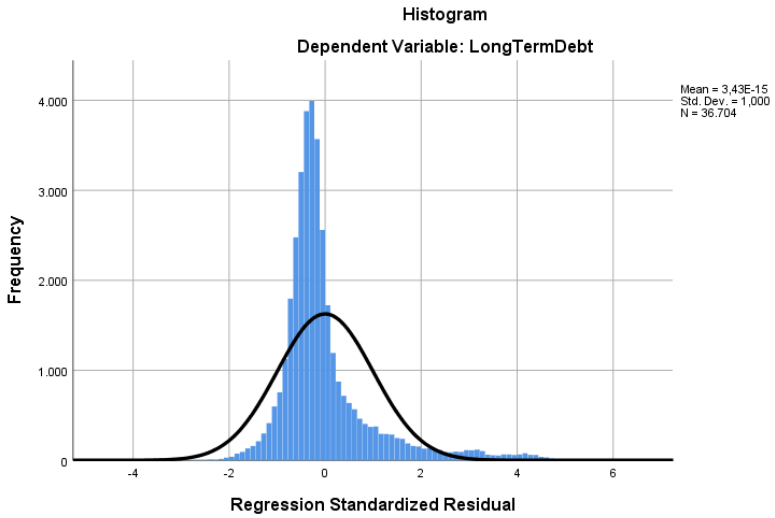
Appendix II: Assumption testing results



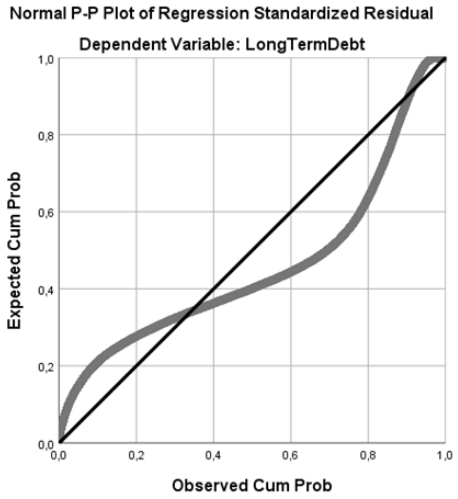
Histogram, P-Plot and scatterplot of table 5 model 1 TD

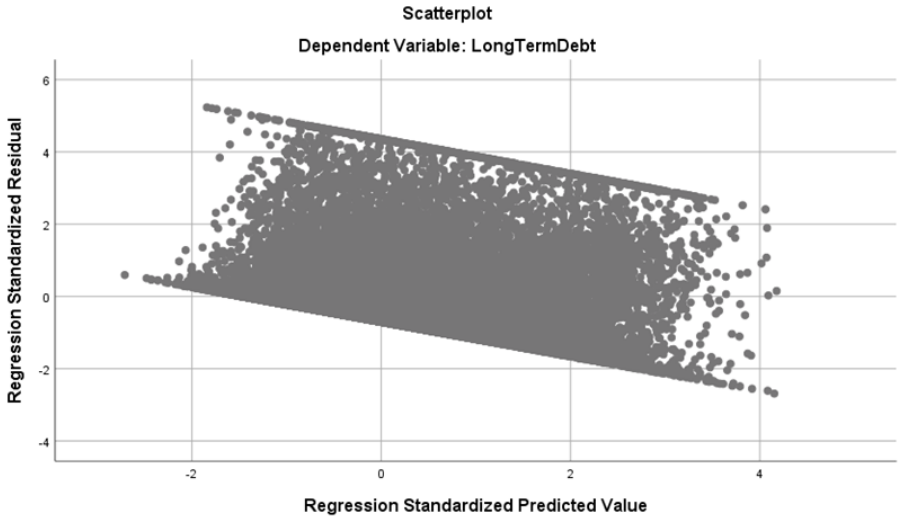


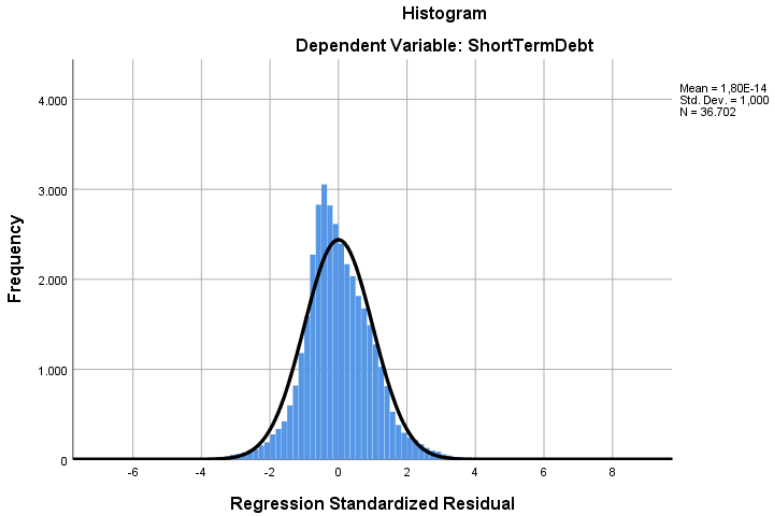




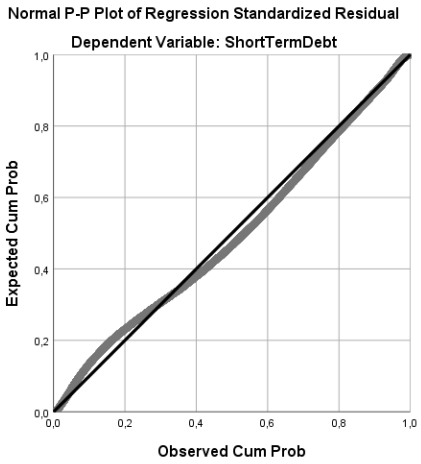
Histogram, P-Plot and scatterplot of table 6 model 1 LTD

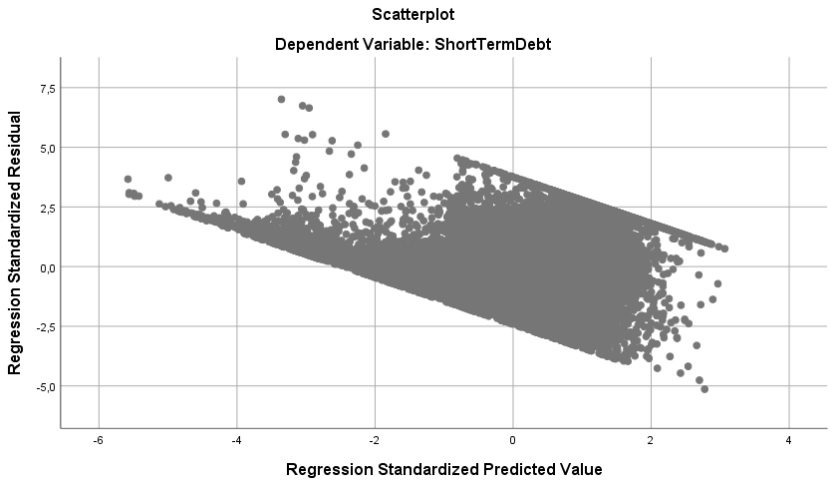


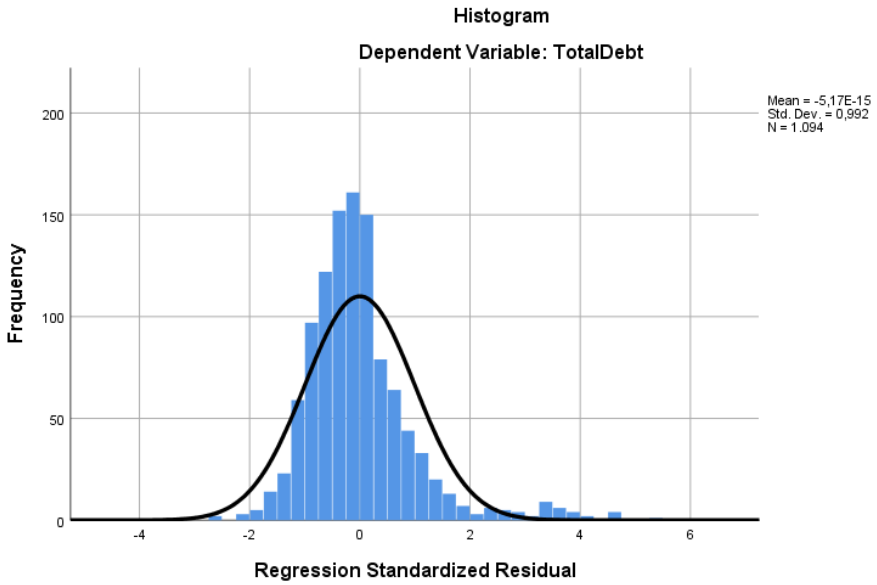




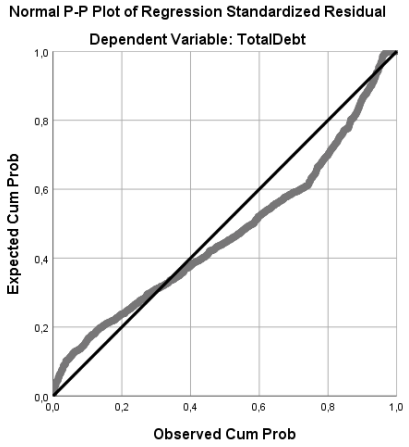
Histogram, P-Plot and scatterplot of table 7 model 1 STD

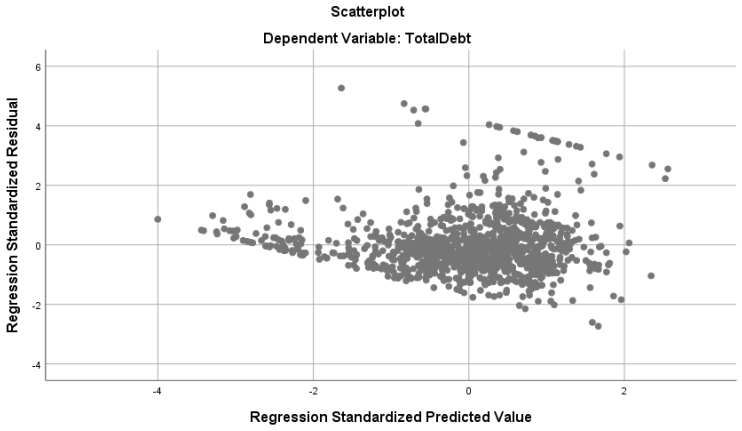


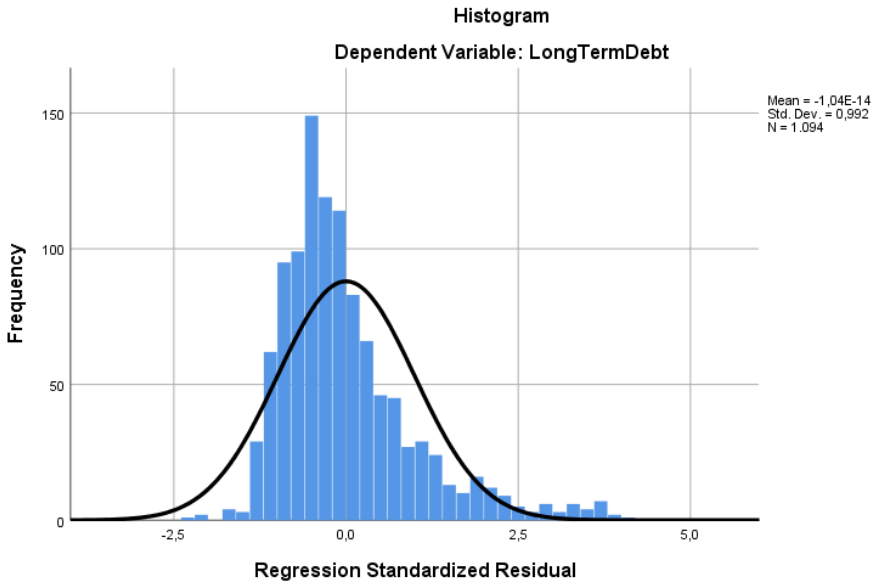




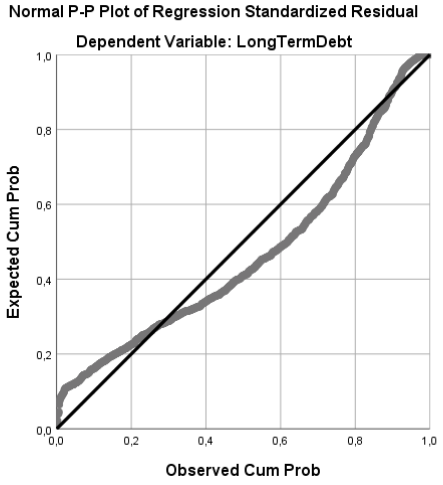
Histogram, P-Plot and scatterplot of table 8 subsample A model 1 TD

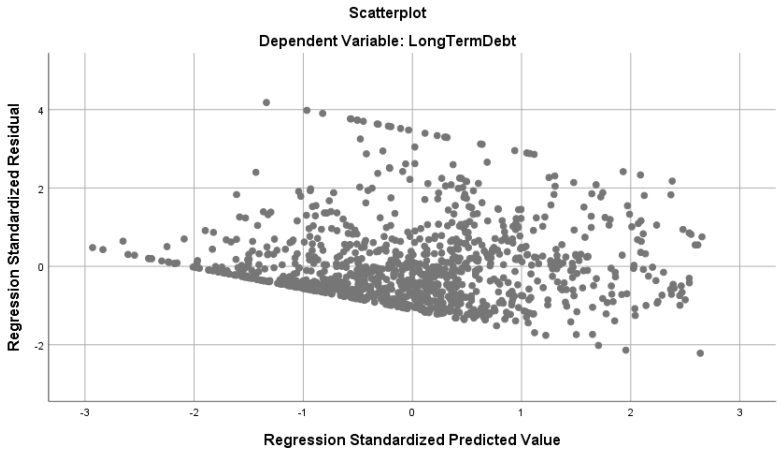


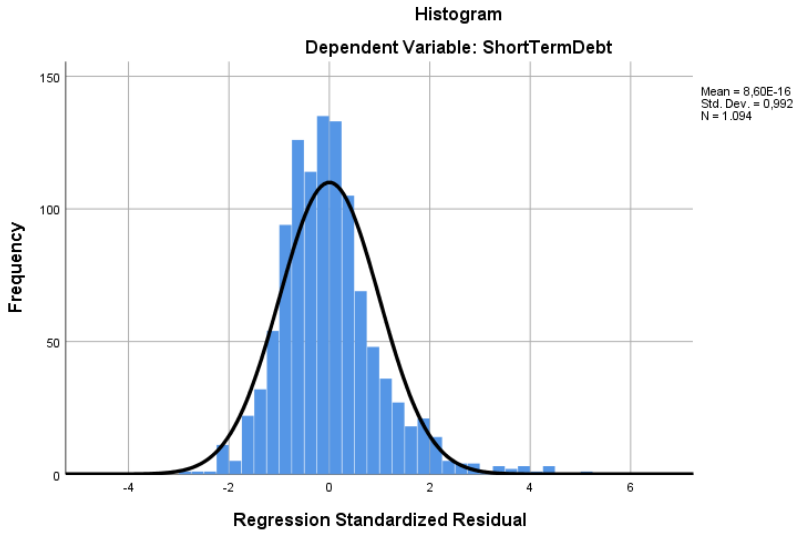




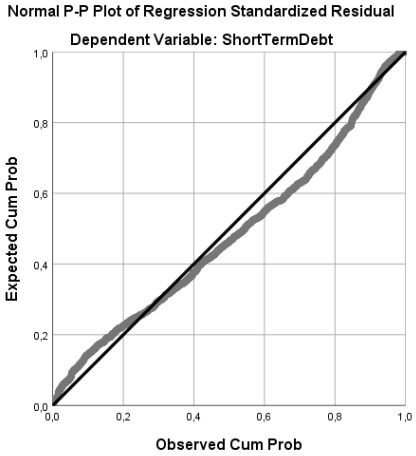
Histogram, P-Plot and scatterplot of table 8 subsample A model 2 LTD

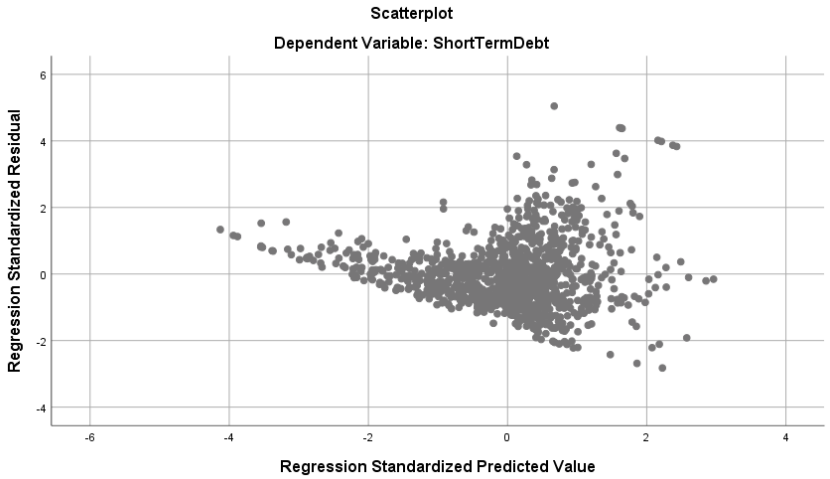


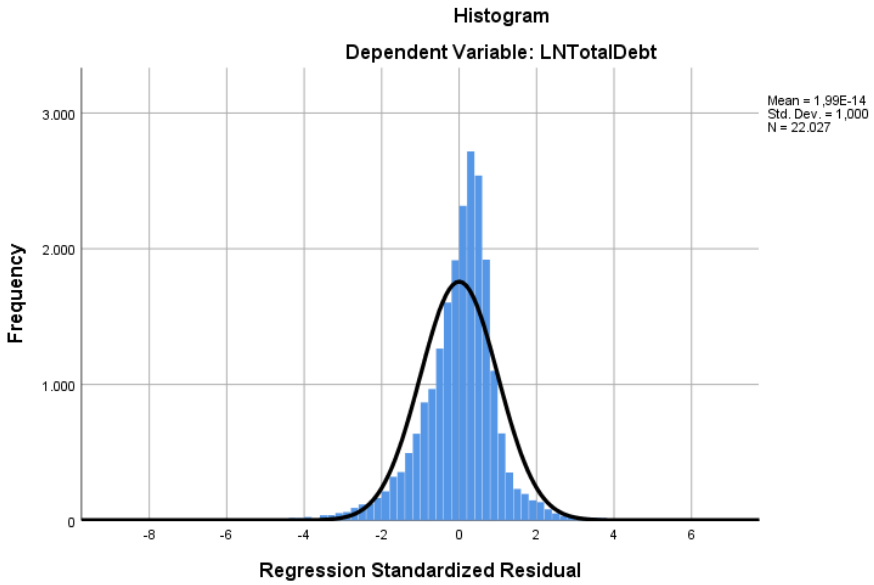




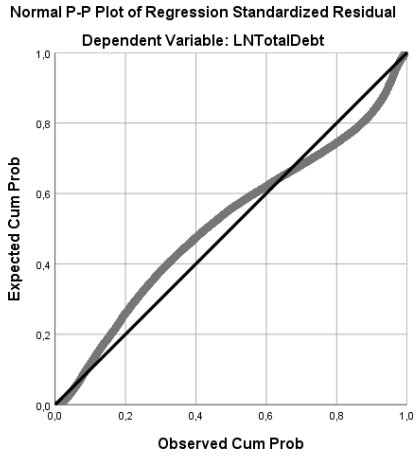
Histogram, P-Plot and scatterplot of table 8 subsample A model 3 STD

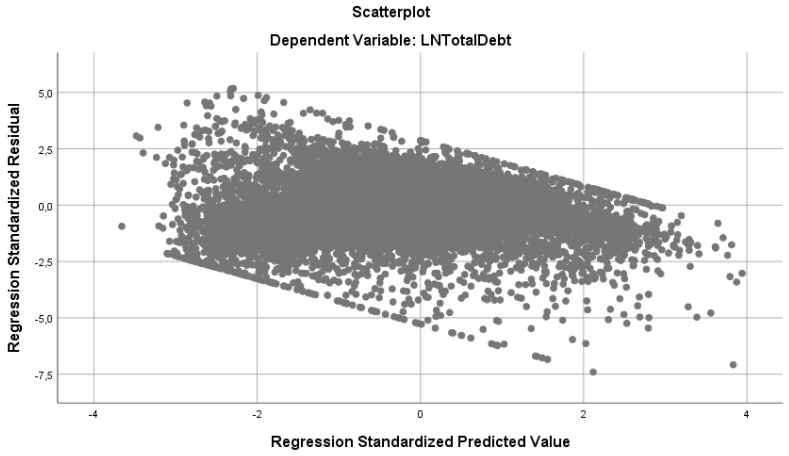


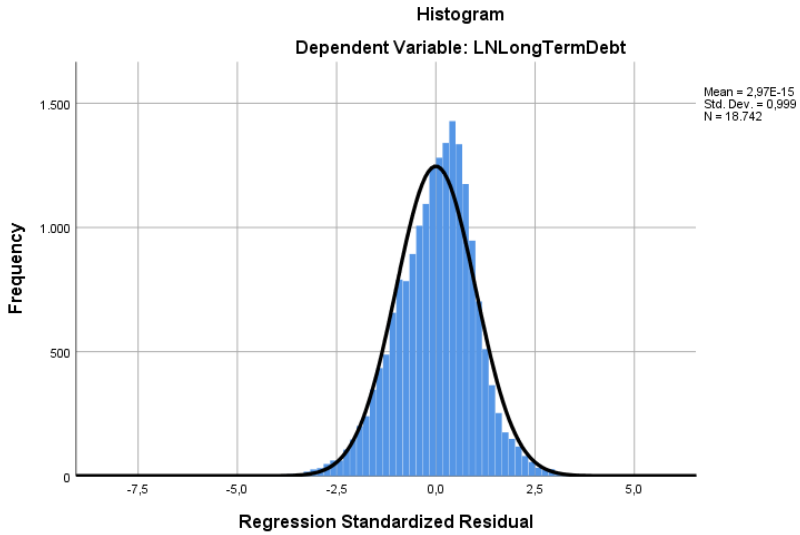




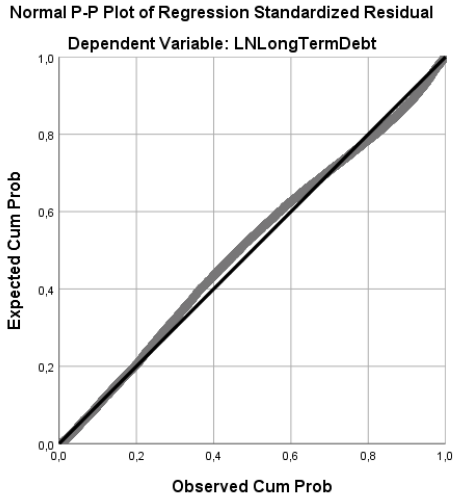
Histogram, P-Plot and scatterplot of table 10 model 1 TD

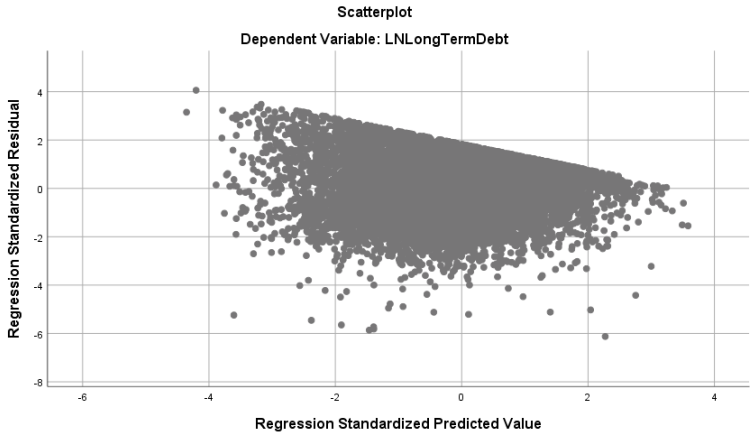


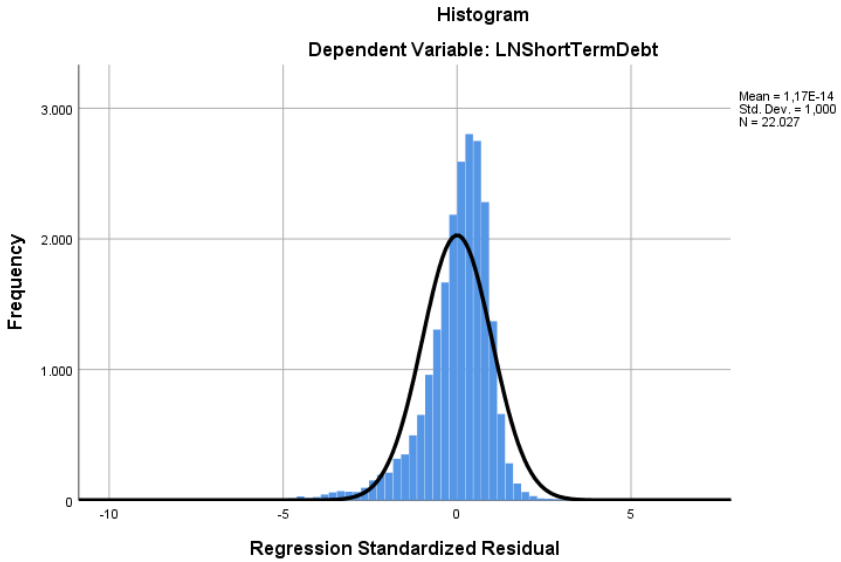




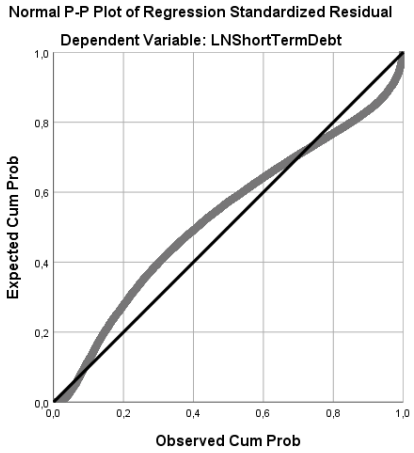
Histogram, P-Plot and scatterplot of table 10 model 2 LTD

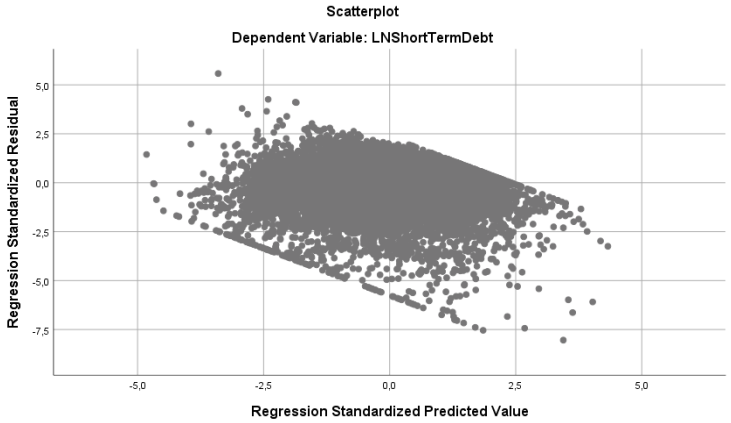


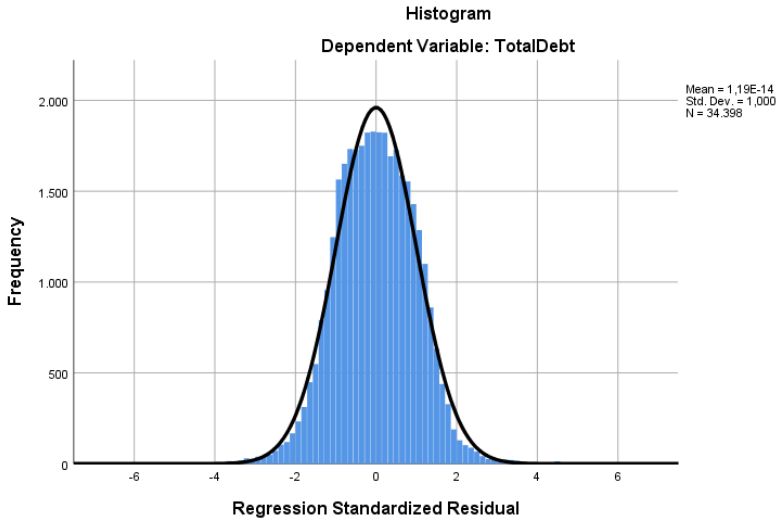




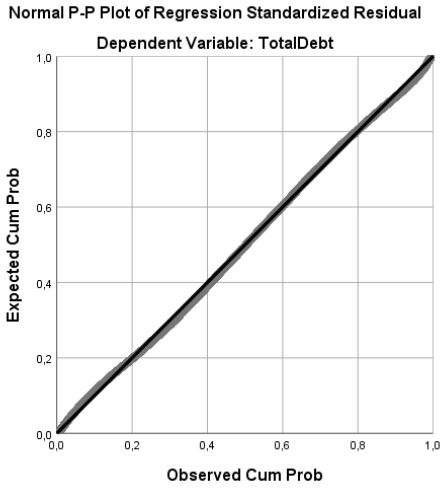
Histogram, P-Plot and scatterplot of table 10 model 3 STD

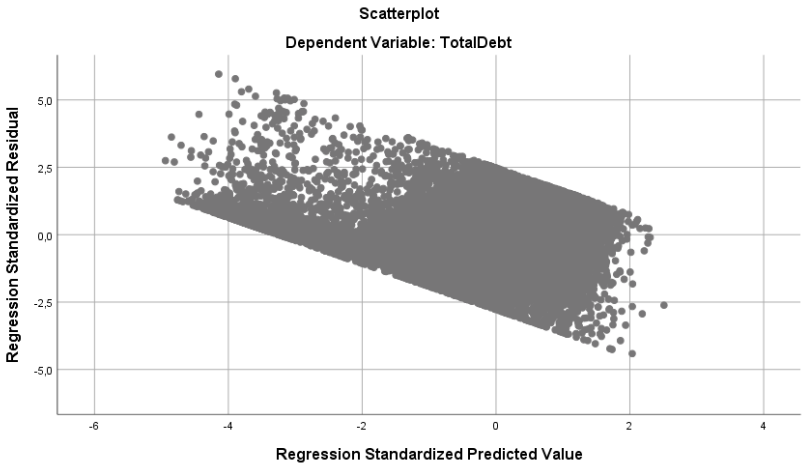






Histogram, P-Plot and scatterplot of table 11 model 1 TD





Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	FirmSizeTminus1	,905	1,105
	TangibilityTminus1	,747	1,339
	GrowthOpportunitiesTminus1	,948	1,055
	TaxShieldsTminus1	,983	1,017
	NonDebtTaxShieldsTminus1	,738	1,356
	RiskTminus1	,883	1,133
	LiquidityTminus1	,901	1,109
	StockListing	,973	1,028
	AgeTminus1	,881	1,136
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,777	1,287
	Ind_TransComm	,817	1,224
	Ind_WholeRetail	,647	1,545
	Ind_Services	,610	1,640
	y2018	,562	1,778
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679

a. Dependent Variable: ProfitabilityTminus1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	TangibilityTminus1	,762	1,312
	GrowthOpportunitiesTminus1	,938	1,066
	TaxShieldsTminus1	,968	1,033
	NonDebtTaxShieldsTminus1	,707	1,414
	RiskTminus1	,900	1,111
	LiquidityTminus1	,907	1,103
	StockListing	,976	1,024
	AgeTminus1	,897	1,115
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,777	1,287
	Ind_TransComm	,817	1,224
	Ind_WholeRetail	,648	1,543
	Ind_Services	,611	1,638
	y2018	,563	1,776
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,917	1,090

a. Dependent Variable: FirmSizeTminus1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,968	1,033
	NonDebtTaxShieldsTminus1	,852	1,174
	RiskTminus1	,919	1,088
	LiquidityTminus1	,907	1,102
	StockListing	,960	1,041
	AgeTminus1	,888	1,126
	Ind_AgriForFish	,960	1,042
	Ind_MinCon	,778	1,285
	Ind_TransComm	,817	1,224
	Ind_WholeRetail	,647	1,545
	Ind_Services	,610	1,640
	y2018	,563	1,778
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,916	1,092
	FirmSizeTminus1	,922	1,085

a. Dependent Variable: TangibilityTminus1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	TaxShieldsTminus1	,968	1,033
	NonDebtTaxShieldsTminus1	,724	1,381
	RiskTminus1	,883	1,133
	LiquidityTminus1	,892	1,121
	StockListing	,962	1,040
	AgeTminus1	,898	1,114
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,777	1,287
	Ind_TransComm	,817	1,224
	Ind_WholeRetail	,647	1,546
	Ind_Services	,610	1,639
	y2018	,562	1,778
	y2017	,574	1,744
	y2016	,584	1,711
	y2015	,596	1,678
	ProfitabilityTminus1	,925	1,081
	FirmSizeTminus1	,903	1,107
	TangibilityTminus1	,746	1,341

a. Dependent Variable: GrowthOpportunitiesTminus1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	NonDebtTaxShieldsTminus1	,707	1,414
	RiskTminus1	,886	1,129
	LiquidityTminus1	,889	1,125
	StockListing	,961	1,041
	AgeTminus1	,880	1,136
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,778	1,285
	Ind_TransComm	,817	1,225
	Ind_WholeRetail	,649	1,542
	Ind_Services	,610	1,639
	y2018	,565	1,769
	y2017	,575	1,740
	y2016	,585	1,709
	y2015	,596	1,678
	ProfitabilityTminus1	,929	1,077
	FirmSizeTminus1	,902	1,108
	TangibilityTminus1	,746	1,340
	GrowthOpportunitiesTminus1	,937	1,067

a. Dependent Variable: TaxShieldsTminus1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	RiskTminus1	,906	1,104
	LiquidityTminus1	,906	1,103
	StockListing	,966	1,035
	AgeTminus1	,890	1,123
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,780	1,282
	Ind_TransComm	,818	1,223
	Ind_WholeRetail	,653	1,532
	Ind_Services	,611	1,637
	y2018	,563	1,777
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,955	1,047
	FirmSizeTminus1	,903	1,107
	TangibilityTminus1	,899	1,113
	GrowthOpportunitiesTminus1	,960	1,041
	TaxShieldsTminus1	,969	1,032

a. Dependent Variable: NonDebtTaxShieldsTminus1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	LiquidityTminus1	,890	1,124
	StockListing	,963	1,039
	AgeTminus1	,888	1,126
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,777	1,287
	Ind_TransComm	,817	1,224
	Ind_WholeRetail	,649	1,542
	Ind_Services	,611	1,636
	y2018	,566	1,767
	y2017	,575	1,739
	y2016	,585	1,709
	y2015	,596	1,678
	ProfitabilityTminus1	,915	1,092
	FirmSizeTminus1	,921	1,086
	TangibilityTminus1	,777	1,286
	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,972	1,028
	NonDebtTaxShieldsTminus1	,725	1,379

a. Dependent Variable: RiskTminus1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	StockListing	,964	1,038
	AgeTminus1	,889	1,125
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,780	1,282
	Ind_TransComm	,822	1,217
	Ind_WholeRetail	,652	1,533
	Ind_Services	,614	1,630
	y2018	,562	1,778
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,928	1,078
	FirmSizeTminus1	,921	1,086
	TangibilityTminus1	,762	1,313
	GrowthOpportunitiesTminus1	,941	1,063
	TaxShieldsTminus1	,969	1,032
	NonDebtTaxShieldsTminus1	,721	1,387
	RiskTminus1	,883	1,132

a. Dependent Variable: LiquidityTminus1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	AgeTminus1	,881	1,135
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,777	1,287
	Ind_TransComm	,817	1,224
	Ind_WholeRetail	,649	1,540
	Ind_Services	,610	1,639
	y2018	,562	1,778
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,926	1,079
	FirmSizeTminus1	,917	1,091
	TangibilityTminus1	,746	1,341
	GrowthOpportunitiesTminus1	,938	1,066
	TaxShieldsTminus1	,968	1,033
	NonDebtTaxShieldsTminus1	,711	1,406
	RiskTminus1	,884	1,131
	LiquidityTminus1	,892	1,122

a. Dependent Variable: StockListing

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,779	1,283
	Ind_TransComm	,817	1,224
	Ind_WholeRetail	,651	1,536
	Ind_Services	,630	1,588
	y2018	,562	1,778
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,915	1,093
	FirmSizeTminus1	,919	1,088
	TangibilityTminus1	,752	1,329
	GrowthOpportunitiesTminus1	,955	1,047
	TaxShieldsTminus1	,968	1,033
	NonDebtTaxShieldsTminus1	,715	1,399
	RiskTminus1	,889	1,124
	LiquidityTminus1	,897	1,115
	StockListing	,961	1,040

a. Dependent Variable: AgeTminus1

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Ind_MinCon	,788	1,269
	Ind_TransComm	,827	1,209
	Ind_WholeRetail	,662	1,510
	Ind_Services	,628	1,593
	y2018	,562	1,778
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,915	1,093
	FirmSizeTminus1	,903	1,108
	TangibilityTminus1	,748	1,337
	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,968	1,033
	NonDebtTaxShieldsTminus1	,707	1,415
	RiskTminus1	,882	1,134
	LiquidityTminus1	,888	1,126
	StockListing	,960	1,041
	AgeTminus1	,881	1,136

a. Dependent Variable: Ind_AgriForFish

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Ind_TransComm	,874	1,145
	Ind_WholeRetail	,758	1,319
	Ind_Services	,734	1,362
	y2018	,562	1,778
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,915	1,093
	FirmSizeTminus1	,903	1,108
	TangibilityTminus1	,747	1,339
	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,970	1,031
	NonDebtTaxShieldsTminus1	,710	1,409
	RiskTminus1	,882	1,133
	LiquidityTminus1	,892	1,121
	StockListing	,960	1,041
	AgeTminus1	,883	1,132
	Ind_AgriForFish	,970	1,031

a. Dependent Variable: Ind_MinCon

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Ind_WholeRetail	,728	1,373
	Ind_Services	,701	1,426
	y2018	,562	1,778
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,915	1,093
	FirmSizeTminus1	,902	1,108
	TangibilityTminus1	,746	1,340
	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,968	1,033
	NonDebtTaxShieldsTminus1	,708	1,413
	RiskTminus1	,882	1,133
	LiquidityTminus1	,894	1,118
	StockListing	,961	1,041
	AgeTminus1	,881	1,135
	Ind_AgriForFish	,969	1,032
	Ind_MinCon	,831	1,203

a. Dependent Variable: Ind_TransComm

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Ind_Services	,835	1,198
	y2018	,562	1,778
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,915	1,092
	FirmSizeTminus1	,904	1,106
	TangibilityTminus1	,746	1,340
	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,971	1,030
	NonDebtTaxShieldsTminus1	,713	1,403
	RiskTminus1	,885	1,131
	LiquidityTminus1	,896	1,116
	StockListing	,964	1,037
	AgeTminus1	,886	1,129
	Ind_AgriForFish	,980	1,021
	Ind_MinCon	,910	1,099
	Ind_TransComm	,919	1,088

a. Dependent Variable: Ind_WholeRetail

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	y2018	,563	1,777
	y2017	,573	1,745
	y2016	,584	1,711
	y2015	,596	1,679
	ProfitabilityTminus1	,915	1,093
	FirmSizeTminus1	,903	1,107
	TangibilityTminus1	,746	1,341
	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,968	1,033
	NonDebtTaxShieldsTminus1	,708	1,413
	RiskTminus1	,884	1,131
	LiquidityTminus1	,894	1,119
	StockListing	,961	1,041
	AgeTminus1	,909	1,100
	Ind_AgriForFish	,985	1,016
	Ind_MinCon	,935	1,069
	Ind_TransComm	,939	1,065
	Ind_WholeRetail	,886	1,129

a. Dependent Variable: Ind_Services

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	y2017	,827	1,209
	y2016	,832	1,202
	y2015	,835	1,198
	ProfitabilityTminus1	,915	1,093
	FirmSizeTminus1	,903	1,107
	TangibilityTminus1	,746	1,340
	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,973	1,028
	NonDebtTaxShieldsTminus1	,707	1,415
	RiskTminus1	,888	1,127
	LiquidityTminus1	,888	1,126
	StockListing	,960	1,041
	AgeTminus1	,880	1,136
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,777	1,287
	Ind_TransComm	,817	1,225
	Ind_WholeRetail	,647	1,546
	Ind_Services	,610	1,638

a. Dependent Variable: y2018

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	y2016	,824	1,213
	y2015	,829	1,207
	ProfitabilityTminus1	,915	1,093
	FirmSizeTminus1	,902	1,108
	TangibilityTminus1	,746	1,340
	GrowthOpportunitiesTminus1	,938	1,066
	TaxShieldsTminus1	,971	1,030
	NonDebtTaxShieldsTminus1	,707	1,415
	RiskTminus1	,885	1,129
	LiquidityTminus1	,888	1,126
	StockListing	,960	1,041
	AgeTminus1	,880	1,136
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,777	1,287
	Ind_TransComm	,817	1,225
	Ind_WholeRetail	,647	1,546
	Ind_Services	,610	1,639
	y2018	,812	1,232

a. Dependent Variable: y2017

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	y2015	,822	1,217
	ProfitabilityTminus1	,915	1,093
	FirmSizeTminus1	,902	1,108
	TangibilityTminus1	,746	1,341
	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,970	1,031
	NonDebtTaxShieldsTminus1	,707	1,415
	RiskTminus1	,883	1,132
	LiquidityTminus1	,888	1,126
	StockListing	,960	1,041
	AgeTminus1	,880	1,136
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,777	1,287
	Ind_TransComm	,817	1,225
	Ind_WholeRetail	,647	1,546
	Ind_Services	,610	1,639
	y2018	,800	1,250
	y2017	,808	1,237

a. Dependent Variable: y2016

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	ProfitabilityTminus1	,915	1,093
	FirmSizeTminus1	,902	1,108
	TangibilityTminus1	,746	1,341
	GrowthOpportunitiesTminus1	,937	1,067
	TaxShieldsTminus1	,969	1,032
	NonDebtTaxShieldsTminus1	,707	1,415
	RiskTminus1	,882	1,133
	LiquidityTminus1	,888	1,126
	StockListing	,960	1,041
	AgeTminus1	,880	1,136
	Ind_AgriForFish	,957	1,045
	Ind_MinCon	,777	1,287
	Ind_TransComm	,817	1,225
	Ind_WholeRetail	,647	1,546
	Ind_Services	,610	1,640
	y2018	,788	1,269
	y2017	,797	1,255
	y2016	,806	1,240

a. Dependent Variable: y2015

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