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An Empirical Analysis of the Determinants of Short- and Long-term Leverage of the Finnish Listed Companies

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Abstract

Reaching an optimal capital structure is a goal for every business. In order to reach that goal, companies issue debt. The aim of this study is to examine whether tangibility, R&D expenditure, market value and the presence of financial experts on boards of directors influence firm's leverage. The analysis was performed on Finnish listed companies between the years 2013-2016 based on firm-level secondary data. The main objective was to determine whether the corporate capital structure is affected by the aforementioned determinants.

Theoretical and empirical literature was collected from diverse literature including corporate reports, academic journals and research articles. Secondary data was collected from official databases and company's financial statements. SPSS software performed both the descriptive, correlational and regression analyses using the data in order to identify causal relationships between the variables.

The results revealed that tangible assets support both short- and long-term debt, as supported by prior studies. R&D expenditure has been long known to support long-term debt, and the results of this study supported that claim. On the other hand, R&D expenditure is known not to be as an ideal determinant of short-term debt, and the results support this conclusion.

Furthermore, the results have indicated that large corporations have fairly easy access to both short- and long-term debt, as supported by prior studies. Lastly, the presence of financial experts on boards of directors revealed not to be a determinant of both short- and long-term debt. This result is opposed to prior studies that have shown that financial experts significantly affect the finance and investment policies.

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1 Introduction

1.1 Background

Capital structure is the composition of a firm's liabilities. Brealey, Myers, & Allen (2011, 4) define capital structure as the choice between debt and equity financing. Every organizaion has the possibility to compose their own debt to equity ratio that suits their preferences, such as their tolerance towards debt. Large corporations have plenty of debt possibilities. They can for example borrow from a bank or by issuing equity, or borrow in different currencies. Also they can decide whether they prefer short-term debt or long-term debt (ibid.). Capital structure is often determined by two theories – The Pecking Order theory and the Trade-off theory (Bartholdy, & Mateus, 2008, 2). In the Pecking Order theory, firms choose the cheapest funding source and when exhausted move to the next cheapest funding source until they end up with external equity. The Trade-off theory is used to explain the decision between debt and equity financing. It is based on the assumption that debt financing should be used due to the tax benefits generated by it, until the optimal capital structure is reached (ibid).

The financial crisis of 2008 had an enormous impact on the global economy. The result of the crisis resulted in extra precautions by lenders, which affected directly on firms' capital structure (Foster, & Magdoff 2008, 11). Further research on this subject is important in order to gain a deeper understanding of the current capital structure. This thesis aims to present the current determinants of short- and long-term debt of Finnish non-financial listed firms, by focusing on four main determinants – tangibility, R&D expenditure, market value and the presence of financial experts on boards of directors.

After reviewing a variety of empirical and theoretical literature, the relevant hypotheses were formed. The most important ones being that tangibility supports both short- and long-term debt, R&D expenditure supports only long-term debt, market value supports both short- and long-term debt and the presence of financial experts on boards of directors does influence on the procurement of debt favourably. The hypotheses were tested by analysing the data collected from Nasdaq

Nordic Stock Exchange OMXH25 firms. There were applied descriptive and inferential analyses in order to develop a better understanding of the association of short- and long-term debt and tangibility, R&D expenditure, market value and the presence of financial experts on boards of directors.

The analyses showed a clear association between tangibility and both short- and long-term debt. The results of tangibility supporting debt matches with the predetermined hypothesis. R&D expenditure, which is already known for supporting long-term debt, does support long-term debt. On the other hand, R&D expenditure is known not to be as an ideal determinant of short-term debt, resulting with another matching hypothesis. In addition, the third hypothesis was accepted, resulting with positive association between market value and both short- and long-term debt. Lastly, the analysis of the presence of financial experts on boards of directors found that there is no association between the two variables, resulting with a rejected hypothesis.

1.2 Motivation for the research

The author's motivation for this research was formed by a great interest in the field of finance in general and the capital structure topic in particular. Since the author wishes to pursue a career in the financial industry, it was inevitable to pick a topic in the field of finance that would further develop the understanding within the field. In addition to the personal motivation, the field may also be contributed by this paper. Capital structure plays a key role in every major corporation, and the importance of it for every organization is immense. Even though there have been numerous re-searches concerning capital structure, it is vitally important to examine the capital structure of current times, and to learn whether there have been changes caused by the latest financial crisis. Moreover, most studies concerning capital structure have been done outside of Finland, and as rules and regulations in different countries vary greatly, the relevance of this research is even more significant.

1.3   Research questions

An extensive literature on the determinants of debt has been generated in recent years. However, not much research has been done in the same area focusing on Finnish firms. This led to the formation of four research questions:

1. Do the tangible assets impact firms' debt (both, short- and long-term)?
2. Does the R&D expenditure impact firms' debt (both, short- and long-term)?
3. Does the market value impact firms' debt (both, short- and long-term)?
4. Does the presence of financial experts on the boards of directors influence the procurement of debt favourably?

In order to answer the aforementioned questions, 23 non-financial, publicly-traded firms on Nasdaq Nordic Stock Exchange (OMXH25) were chosen and explored. This study examines the determinants of short- and long-term debt. Therefore, the relationships of tangibility, R&D expenditure, market value and the presence of financial experts on boards of directors are discussed in depth. The secondary data was collected from the corporate annual reports between the years 2013-2016, and other financial sources, such as Bloomberg and Reuters. The key variables were analysed by using correlation and regression analyses with the help of SPSS statistics software.

1.4   Structure of the thesis

The remainder of this thesis consists of four main chapters. In the second chapter, "Theoretical Framework and Literature Review", the empirical research of previous studies, as well as, the theoretical background by discussing in detail the key concepts concerning this research are being presented. This chapter helps forming the foundation for the creation of the hypotheses. The third chapter, "Methodology", describes the research approach and the data analysis method used to collect and analyze data. The fourth chapter, "Research Results", presents the findings of the analysis performed on the data. These findings are divided into three parts – descriptive statistics, correlation analysis and regression analysis. The fifth and final chapter, "Discussion and Conclusions", elaborates on the research questions' results in addi-

tion to comparing them with their hypotheses. Furthermore, it discusses the implications and limitations of the research as well as the recommendations for future research.

2 Theoretical Framework and Literature Review of Leverage

In order to understand why firms use debt to finance their operations, it is utmost important to understand how the capital structure is composed. On one side there is the shareholders' equity (net worth) and, on the other, there are the liabilities (debt). If a firm is looking for expansion or facing financial difficulties, they might be looking for additional capital that comes in a form of debt to finance their activities.

The next subchapters present empirical and theoretical literature about corporate debt in today's economy, and the determinants affecting the likelihood of a firm issuing debt will be reviewed and explained in the following order: tangible assets, intangible assets, firm market value, and financial experts on boards of directors.

2.1 Corporate debt in today's economy

A firm's capital is composed of internal financing (revenue) and external financing (leverage). Myers (1984, 581) states that according to the Pecking Order theory, firms will use their retained earnings first (internal financing), only when that is depleted debt (external financing) is issued and when it is no longer sensible to issue additional debt, equity is issued. Based on the Pecking Order theory, firms are reluctant to take debt due to its risk, nor willing to sell their ownership stakes, and prefer using their own revenues in order to finance their operations. However, there are several other factors influencing greater usage of leverage, for example, a firm's life cycle. In the expansion stage, firms often experience rapid growth and are looking to enter new markets, therefore, they are in need for external financing. Also, as larger and more diversified firms face lower default risk, lenders may offer deals with favoring conditions, which might persuade the aforementioned firms issuing additional debt. Furthermore, to which industry they belong may affect on different usage levels of leverage (Frank, & Goyal, 2004, 9-13). Bradley, Jarrell, & Kim (1984, 876) have made tests presenting industry differences in leverage ratios. They

have found that there is a strong industry influence on firms' leverage ratios. The following figure clearly presents that financial services and automotive industry prefer issuing more debt.

Leverage by Industry
(*Corporate Finance*, Berk and DeMarzo, 2nd edition)

% Debt Financing by Industry *D/(E+D)* (Market value E)
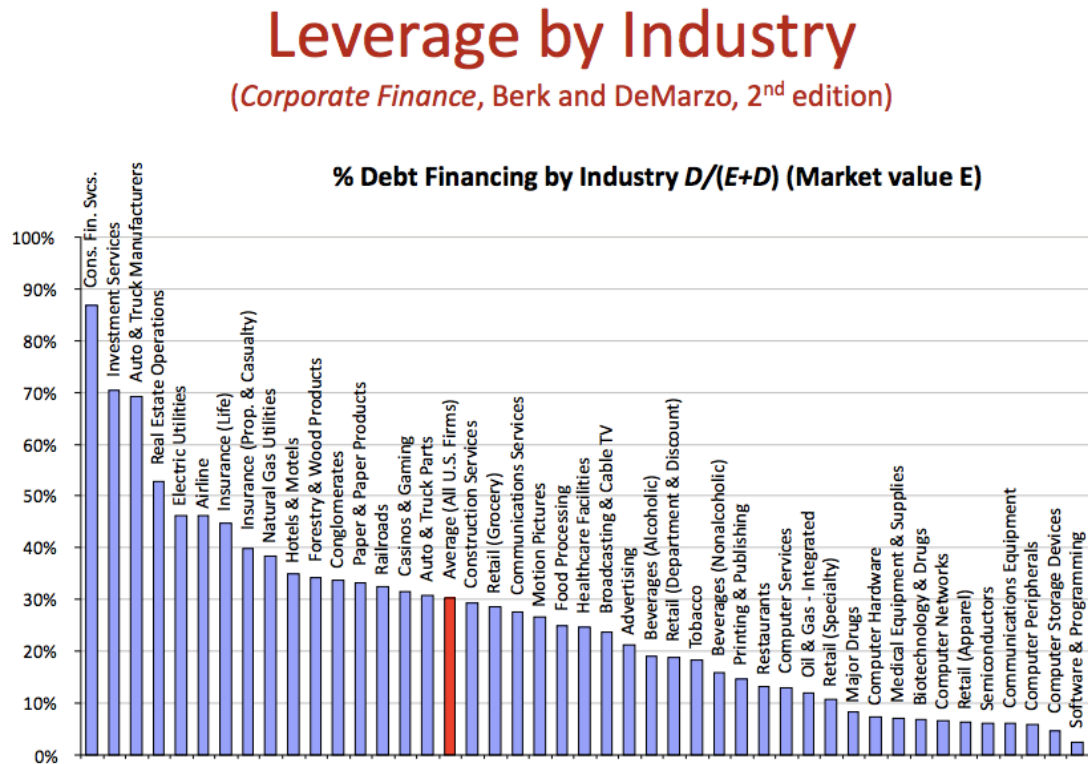
Figure 1 - Do all companies use leverage? (Yglesias, 2014)

Debt to equity ratio is a well-known method to measure a firm's financial leverage. It is calculated by dividing a firm's total liabilities by its stockholder's equity (The Economic Times, 2018). The D/E ratio indicates the financing that comes from creditors and investors as a percentage of its equity (Oxford Reference, 2018a). A debt to equity ratio greater than 1, indicates that a firm uses more creditor financing (debt) than investor financing (shareholder's equity).

$$\text{Debt to Equity Ratio} = \frac{\text{Total Liabilities}}{\text{Total Equity}}$$

Figure 2 - Formula of debt to equity ratio (Wikiaccounting, 2018)

Brealey, Myers, & Allen (2011, 465) state that an optimal capital structure is the optimal debt to equity ratio a firm can have in order to minimize its cost of capital and to maximize its market value. Frydenberg (2004, 25) claims that if a firm does not borrow, it wastes precious equity, and the only dilemma is how much every firm should borrow. According to Binsbergen, Graham, & Yang (2011, 31), we have come a long way towards a better understanding of why and how firms choose their capital structure up to the point we can determine the optimal capital structure based on the marginal cost and marginal benefit of optimal and or suboptimal debt for a given firm. Their research has found that when firms use the optimal capital structure, their average net benefit of debt is 4% of firm value and as high as 13% for some firms. They also found that the cost of using too much debt is higher than the cost of using too little debt, which may explain why firms use debt conservatively.

Brealey, Myers, & Allen (2011, 597) state that there are numerous ways in which a firm can issue debt. A firm can issue bonds both in its home country or in another country, it can take mortgages on a real estate, or by taking traditional loans. Those loans may be collateral free or asset-backed securities. In case the loan is asset-backed security, and the firm is facing a financial distress the lender may claim his collateral. The most common collaterals are account receivables, real estates and lease payments (ibid. 597-602).

The debt vs. equity financing dilemma is one faced by many business owners looking for capital to expand their business. Debt financing includes short- and long-term credit a business receives from a lender. Kunigis (2017) provides a list of benefits and drawbacks associating with debt financing.

Benefits of debt financing:

- Maintain ownership: Although the firm is obligated the agreed-upon payments on time to the lender, they are able to retain the right to run the business however they wish without external interference.
- Tax deduction: Any interest paid on borrowed money for business activities is tax deductible.

- Lower interest rates: Firms with excellent credit rating may get only 10% interest rate on their debt, whereas, at the same time Government tax may be at 30% tax rate.
- Easier budget planning: When firms know exactly how much and when they are required to pay, it makes it easier to create a budget and make financial plans.

Drawbacks of debt financing:

- Qualification requirements: Firms with poor credit score might not be able to find a lender willing to borrow them money.
- Costs of debt: a Firm is required to pay an effective tax rate, which might not be favorable.
- Repayment: Even if a business fails, it still requires repaying its debt to the lender unless declared bankruptcy.
- Collateral: By agreeing to provide collateral to the lender, a firm puts its business assets at risk. At times, the shareholders are required to sign a loan guarantee for a portion or all of the debt.
- Impact on credit rating: It might seem attractive to keep "levering up", but each loan is noted in a credit report and will affect the credit score because the more a firm borrows the riskier it becomes to the lender and the subsequent loan will demand a higher interest rate.

Terms of Debt

Debt maturity refers to the final payment date that the debtor requires to repay its loan or other financial instrument including all interests in full (Oxford Reference, 2018b). When a debt matures, the contract between the two parties ends. However, some fixed-income securities are "callable", which means that the debtor is able to repay its debt at any time before the debt matures.

Debt is classified into two terms, short- and long-term debt. Short-term debt represents any financial obligations that are due within one year. Short-term debt presented in a firm's balance sheet under "Current liabilities" (Nasdaq, 2017a). Long-term debt consists of loans and financial obligations that are to be matured in a

greater than one year period. Long-term debt is presented in a firm's balance sheet under "non-current liabilities" (Nasdaq, 2017b).

There are real evidences of the importance of short-term lending in recent years. Custódio et al. (2012, 1) have found that over the last three decades, there is a trend across firms to issue more short-term debt. There are several reasons for this immense growth of short-term lending. Short-term debt mature every year, which gives lenders their funds back for additional lending. Also, these debts are often in substantial lower sums than long-term lending usually are, what makes them more available for firms seeking for additional funds. Another reason to why we have experienced such a great level of growth in recent years is because it is easier for firms to qualify for short-term loans. The documentation requirement has gone looser, business owners can only provide several bank statements with additional of minimal paperwork (Wood, 2017). Firms often issue short-term debt in order to cover inventory costs and are often tied to growth and expansion (Brealey, Myers, & Allen, 2011, 352, Kumar et al. 2012), whereas firms issuing long-term debt are often tied financing long-lived assets such as plant and machinery (Brealey, Myers, & Allen, 2011, 733).

Long-term debt has distinct characteristics to why firms prefer issuing it. Firms using collateral to secure their long-term debt are often getting preferable lower interest rates (Benmelech, 2009, 1581). Furthermore, Long-term loans tend to be more stable. The agreed upon payment method is being applied with normal stability over the course of the loan, and the timing of payments and the interest rate level usually remain constant over the life span of loan repayment (Chron, 2017).

Fan, Twite, & Titman (2010, 2) have found that a country legal taxation system, level of corruption and the preference of capital suppliers explains to a large extent the variation in leverage and debt maturities. Their results shows high correlation between countries that viewed as more corrupt tend to take more debt in general and issue more short-term debt in particular. Similarly, there is also a high correlation between countries with more common laws to be less levered and to issue more long-term debt. They also found that suppliers of capital may control how firms are financed. There is a high correlation in countries with larger banking sector to shorter

debt maturities. In addition, the existence of bankruptcy is well associated with higher debt ratios and a greater use of long-term debt.

Shareholder's Equity

It was previously mentioned that the capital structure is composed of both external and internal financing. For the latter one, there are two ways for raising equity financing. Firstly, in case the firm is not a publicly-traded firm, they can sell a fraction of the firm's ownership to the public and use the additional capital as they wish. Furthermore, in case the firm is already publicly-traded, they can issue new shares of stock. Secondly, equity financing is possible by taking the cash flow generated by existing assets and reinvest the cash in new assets (Brealey, Myers, & Allen, 2011, 4). According to the Pecking Order theory, issuing equity should be the firm's last resort.

2.2 Tangible assets

Tangible asset defined as any asset that has a physical form with clear purchase value (Oxford Reference 2018c). Tangible assets are composed of current and fixed assets. Current assets (also known as liquid assets) in addition to cash, are items in which a business expects to gain profit from by the end of the financial year, for example inventory (business dictionary, 2018a). Fixed assets are physical items that cannot be sold easily at any point. Such items may be considered long-term investment or due to their day-to-day use, examples of fixed assets are machinery, property and land (business dictionary, 2018b).

Countless large corporations seek for debt in order to finance additional projects and innovations. Financial institutions, which in most cases are the lenders wish to minimize their risk by pledging a collateral to protect themselves in case the borrower is unable to repay its debt. Many prior studies have found a positive correlation between tangibility and leverage. Tangible assets (both current and fixed assets) provide a useful channel of borrowing in firms that can pledge their tangible assets as collateral (Almeida, & Campello, 2007, 2-3, Lim, Macias, & Moeller, 2014, 3-4). These studies show that tangible assets support more borrowing, which may allow for additional investment using tangible assets as collateral.

Tangible assets tend to be less risky and easier to value than intangible assets. Therefore, borrowing costs should be relatively lower when tangible assets serve as collateral for the firms' debt (Lim, Macias, & Moeller, 2014, 3-4). Common sense suits well with their theory. In case of insolvency of the borrower, the lender may claim the tangible assets (collateral) and to recover at least some value that otherwise would have been lost.

There are several advantages for having tangible assets. Large amount of tangible assets affects the credit status of a firm. Businesses with more tangible assets may have greater access to external funds (both short- and long-term) (Almeida, & Campello, 2007, 29). Another advantage of having ample amount of tangible assets is in case of financial distress. Tangible assets can always be liquidated and turned into cash. However, tangible assets are not immune to depreciation. Nearly all tangible assets can be depreciated and lose value, therefore, tangible assets serving as collateral for short- or long-term debt are definitely not risk free (Investopedia 2017a).

2.3   Intangible assets

Intangible assets defined as assets that can neither be seen nor touched. They vary between patents, brand names, trademarks, copyrights, research and development, goodwill, etc. (Oxford Reference, 2018d). In recent years, Intangible assets are taking a bigger share of value. According to Ocean Tomo (2015), at the year of 1975, intangible assets represented only 17% of S&P 500 value, only 40 years later its share undergone an astonishing rise up to 87% (see figure).


COMPONENTS *of* S&P 500 MARKET VALUE
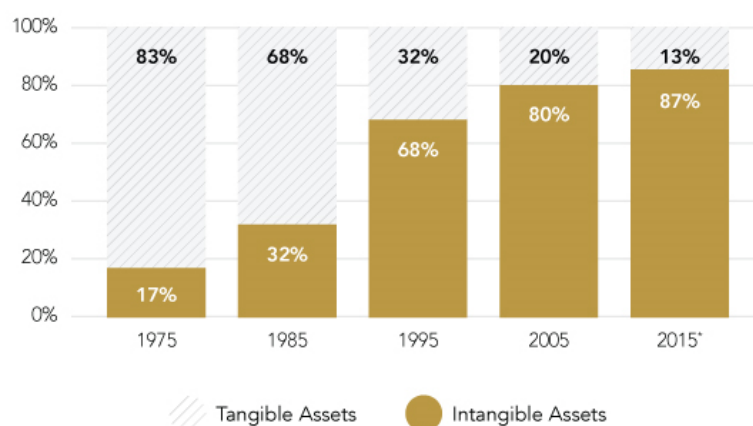
SOURCE: OCEAN TOMO, LLC

Figure 3 - Components of S&P 500 Market Value (Ocean Tomo, 2015)

Characteristics and difficulties for firms with intangible assets:

Although firms with intangible assets are diverse, clearly they share their own characteristics. In the next bullet points the characteristics and difficulties are elaborated and explained.

- Association between intangible assets and debt

It is well known that firms with more tangible assets tend to have more debt. The main reason for that phenomenon is that tangible assets may serve as safer collateral than intangible assets often are. Another reason why tangible assets support more debt than intangible assets is because they tend to be less risky and easier to value.

According to Lim, Macias, & Moeller (2014, 20-21), firms with insufficient amount of tangible assets may also support debt well. A study conducted by them has shown to what extent intangible assets support debt. According to their research, "on average, one dollar of intangible assets supports approximately three quarters as much debt as one dollar of tangible assets". Their study's results suggest that intangible assets supports debt well because they support the repayment of debt, and that some intangible assets can potentially serve as collateral. We may also learn from their results that the ratio of a firm tangible to intangible assets is associated with the firms' types of debt. Firms with fewer tangible assets tend to be riskier borrowers. Correspondingly, these firms tend to have debt with more protecting features for lenders, such as short maturities, more term loans, more convertible debt, less fixed-rate debt, etc. Their results fit well with the general assumption that tangible assets support debt better than intangible assets do. However, when firms do not own an abundance of tangible assets, intangible assets supports debt almost as well as tangible assets do.

- Valuation difficulties

It has long been recognized that intangible assets expenses are facing great valuation difficulties. The problem lies in the accounting rules to distinguish between the two

types of intangible assets: The ones that are acquired externally, through transactions such as mergers and acquisitions, and the others that are self-created internally such as R&D, marketing expenses, etc. (Damodaran, 2010, 4). Self-created intangible assets are not reflected in financial statements, instead, they are incorporated into general operating expenses. When such intangible assets are not presented in the financial statements, firms' market value appears smaller than it is actually is (ibid.). Another problem that arises by intangible assets valuation is that it is extremely difficult to fairly assess their true value. Researches usually cannot observe the book value of Intangible assets such Apple's iOS and macOS, Microsoft's Windows and Office software and Coca Cola's Brand name, not to mention market or fair values. The results are that researchers provide sporadic estimations that at times might cause a great increase or a decrease to a firms' true value (Lim, Macias, & Moeller 2014, 2).

- Equity options

Although both tangible and intangible asset oriented firms use equity options as part of their management compensation, the general perception is that intangible asset oriented firms tend to compensate its employees much more in such manner (Damodaran, 2010, 5). One might argue that it might be attributed by the location of firms in the life cycle. Often Intangible asset oriented firms are in their growth stage, (for example, high-tech companies), and they are unable to compensate in other ways. However, the reason to why intangible asset oriented firms tend to compensate its employees with equity options may be related to how dependent these firms are in retaining human capital.

2.4 Firm market value

Market value, also referred to as market capitalization is the total market value a firm is worth. It is calculated by multiplying the number of its outstanding shares by the current market price of a firm's shares (Nasdaq, 2017c). The valuation of a private firm is significantly more complicated than a publicly-traded firm. In order to determine firm market value of privately-owned company, it is needed to conduct several major estimations that an individual investor may be unable to conduct without some access to relevant financial information of the privately-owned company (Damodaran, n.d.). For those with the access to the aforementioned information, it is

much simpler to evaluate the firm's market value. For such evaluation the discount rate estimations and the total beta estimation are needed, together with an estimation of the cost of debt and capital of that given firm (ibid.). In real estate for example, each piece of real estate is unique, therefore, the best approximation of market value is to compare recent sales of similar properties (Investopedia, 2018a). As Fidelity (2017) explains, market value as a concept is extremely important because it allows investors to differentiate the relative size of a business in a comparison to any other business. Market value measures the company's real value on the open market, in addition to the market's perception of its future prospects because it reflects what investors are willing to pay for its stock.

Market value is differentiated by its size. While there is no one set framework to define each size, the following table concludes a widely used framework agreed by many (Investopedia, 2017b).

Table 1 - Market cap sizes (Source: author)

Market cap category	Market cap $	Firms from OMXH25 used in the research
Mega-cap	$200B+	
Large-cap	$10B – $200B	8
Mid-cap	$2B - $10B	13
Small-cap	$300M – $2B	2
Micro-cap	$50M - $300M	
Nano-cap	$0M - $50M	

Firms with high market value may enjoy certain advantages due to their large size. For example, the stock price of such firms tends to be less volatile than smaller market value firms because their products and services are proven on a national and or international scale and are likely to continue being sold in times of recession (Chron, 2017). From the investor's perspective, firms with higher market value can be more attractive than smaller market value firms because they tend to be more stable and to offer generous periodic dividends. However, large market value firms also face limitations. Firms at this magnitude are often well-established and expanded, therefore, they tend to have lower growth potential than smaller firms. Having higher

growth potential can be attractive to investors because they offer the potential for big gains in a relatively short period of time (ibid.).

Even though there are intangible asset oriented companies, often companies with very high market value tend to own a substantial amount of tangible and intangible assets as well. As previously mentioned, tangible assets may serve as collateral for firms seeking for credit. Financial institutions may feel more secure lending money to firms with such large market value since they are more likely to be able to repay their debts on time. In case these companies are in a financial distress, their large amount of tangible and intangible assets may reduce the lender's loss (Lim, Macias, & Moeller, 2014, 5). As for individual investors, companies with high market value tend to be less risky borrowers because they are less volatile to price fluctuation and recession, what makes them a safer investment for individual investors (Morningstar, 2017).

2.5   Financial experts on boards of directors

A board of directors is a group of appointed or elected to represent the shareholders of for-profit, non-profit and Government agency organizations (Brealey, Myers, & Allen, 2011, 14). Boards of directors establish administrative policies such as hiring and firing of executives, distribution of dividends and executives' compensation, as well as protecting interests of the administration. The boards also make decisions on behalf of shareholders, in order to protect their own investments on the company (ibid.).

The boards of directors are composed of experts of various fields, some are financial experts. It is expected of financial experts to lead the firm towards an optimal capital structure. In order to reach that goal, firms need to have the right proportion of debt to equity. Financial experts may be able to use their reputation and connections to assist in the procurement of issuing additional debt with favorable conditions. Güner, Malmendier, & Tate (2006, 29-30) have found that when commercial bankers join boards, external funding increases and investment cash flow sensitivity decreases. Their research results support the assumption that the presence of financial experts on the boards of directors influences the procurement of debt favorably.

When it comes to board of directors, there are several factors that may influence their performance. In the next sub-chapters these factors are elaborated and explained.

2.5.1 Association between agency theory and debt

Agent is a person that acts on behalf of another person or a group (Business Dictionary, 2018c). Agency theory is concerned with resolving conflicts that develop among the stockholders, bondholders and the managers (Nasdaq, 2018d). In case of publicly-traded corporations, the board of directors (agent) are making decisions on behalf of shareholders (principals) and the board of directors (principal) oversees decisions taken by the acting management (agent).

Boards of directors may experience the agency theory very often. There are two problems that agency theory often addresses. The first type of conflict is between the acting management and the board of directors. Such agency problems may arise between these two parties due to management members' self-interest to seek for promotion, or by poor monitoring actions by the boards that may lead to lower quality of the financial reporting (Hundal, 2016, 342). The second type of conflict is between the shareholders and the board of directors. Such agency problems may arise between these two parties due to different tolerances towards risk (Investopedia, 2018b). These types of conflicts may occur when the board is willing to take a bigger risk than the shareholder truly wish to. Another problem that may occur between the shareholders and the board of directors is due to conflict of interests. There might be a board member who is also a member of a competitor's board. Such conflict of interest might lead to delay in decision making and by not acting in favor of the firm (Armour et al. 2009, 2).

Agency problems may affect financial experts in decisions relating to financing of assets. Problems as such may occur when the shareholders are not willing to issue additional debt, whereas, the financial experts are willing to exploit the additional funds and enjoy the tax benefits that comes along. On the contrary, it may be times when the financial experts do not support issuing additional debt due to their knowledge of the optimal capital structure, whereas, the shareholders are the ones

who are pushing for issuing additional debt. Agency problems may cause that financial experts do not manage to truly influence the capital structure.

2.5.2 Composition of the board of directors

Efficient board of directors is a crucial tool for a company to build its performance, create reputation, as well as to monitor the executive directors and to provide resources for the company such as access to debt (Hillman, & Dalziel, 2003 387-388). With that being said, the board composition becomes even more vital for an organization success. In order to understand how shareholders decide on the board's composition, it is important to take into account in which kind of development stage the company is at the moment of the board's composition.

According Hillman, Golden, & Lynall (2003, 416), the timing of the formation of the boards affects greatly on its performance. At what point of organizational life cycle the board formed often defines the board's probabilities to succeed. Quinn, & Cameron (1983, 35) find four distinct stages of life cycle that each of them affects differently on the composition of the board. The first is the entrepreneurial stage. At this stage, companies conduct early innovation and formatting their niche. The second is the growth stage. At this stage, companies generate a consistent source of income. The third is the expansion stage. At this stage, companies often experience rapid growth in both revenues and in cash flows and are looking to expand to new markets. The fourth is maturity and decentralization stage. At this stage, companies either look to remain stable or to exit some markets (ibid.). In entrepreneurial stage, shareholders are more likely to assign more sales and innovation oriented directors, whereas, in maturity and decentralization stage, shareholders are more likely to assign directors with greater knowledge in mergers and acquisition and in organizational structure. However, over time firms resign and assign new board members in order to create a balance of expertise amongst the board members.

Boards of directors are not composed only according to individual expertise, but also according to their connections to the firm. Boards of directors are composed of inside and outside directors. Inside directors are directors who are also employed in

the company (Brealey, Myers, & Allen, 2011, G-1), whereas, outside directors are directors who are not employed nor being a stakeholder of the company (Cambridge Dictionary, 2018).

A board consisting of large majority of outside directors is an independent board. There are many advantages of an independent board. For example, differently than inside directors, outside directors do not have an interest of getting promoted, and therefore will provide vigilant oversight over the firm's executives (Financial Times, 2017). Based on speculations, one might assume that a firm's value decreases when the fraction of insiders on the board increases. However, there are several arguments against that claim. Coles, Daniel, & Naveen (2005, 3) have found that R&D intensive firms may derive greater value from having a larger fraction of inside directors because they possess more firm specific knowledge. Baysinger, Kosnik, & Turk (1991, 212) have found that boards with greater representation of inside directors increases R&D spending. Baysinger, & Hoskisson (1990, 74) claim that inside directors can be better at selecting an appropriate strategy due to their in-depth knowledge of the firm.

Financial experts on boards of directors may be inside or outside directors. Similarly with Baysinger, & Hoskisson claim, financial experts who are inside directors may have an edge over financial experts who are outside directors of the same firm because they may have greater knowledge of the firm. However, inside directors may act irrationally due to their self-interest for seeking a promotion. Financial experts who are outside directors may have greater financial experience and connections to benefit the firm. However, some financial experts who are outside directors may suffer from excessive workload, resulting in poor work performance for either firm.

2.5.3 Board size

Across firms and industries, there are different sizes of boards of directors. Much of prior literature suggests that smaller boards are more successful. The arguments are based on that the smaller boards are more cohesive, more productive, and can monitor a firm more efficiently, whereas, larger boards may be less effective due to coordination problems and problems such as free-riding (Jansen, 1993, 865, Lipton, & Lorsch, 1992, 67-68, , Coles, Daniel, & Naveen, 2005, 6). Lipton, & Lorsch (1992, 67-

68) argue that boards with 8 or 9 members are the most effective. They believe so because in bigger boards, it becomes in harder for every member to express their ideas and opinions inside the limited time available at board meetings.

Furthermore, Hundal (2017, 156) has found that when directors are members in a large number of boards, they may suffer from "busyness". Such problem may arise to both inside and outside directors. For inside directors, it may affect by not spending sufficient time in their firm, which may lead to underperformance in their day-to-day managerial tasks and not gaining enough firm-specific experience and knowledge that might affect to poor monitoring actions. (Dalton et al. 2003 20-21). For outside directors, it may affect by not being able to effectively monitor managerial actions (Jackling, & Johl, 2009, 497, Ferris et al. 2003, 1096-1097), and by conflict of interests by serving on boards of competitors, which may lead to delays in decision making and by not acting in favor of the firm (Fich, & Shivdasni, 2006, 691, Armour et al. 2009, 2). However, not all scholars believe smaller boards are better. Yermack (1996, 209) has found a negative relation between Tobin's Q (total market value / total asset value) and board size for 452 large U.S. industrial corporations between 1984 and 1991. This means that according to the research, these firms' market value was undervalued, which might imply that often smaller boards fail to create the firm's value as it is truly valued.

There has been numerous studies about the advisory role of the board. Rose, & Shephard (1997, 511) claim that diversified firms are more complex, and therefore require bigger boards of directors. Klein (1998, 8) argues that complex organizations require for more advisory to CEOs. Both Pfeffer (1972, 223) and Booth, & Deli (1996, 87-88), argue that larger firms are more likely to have larger boards because they need more external contracting relations. For example a well-diversified firm such as General Electric, have a very large and diversified board (17 board members in December 2017). They vary between financial services, retail and automotive, paper and packaging, and truck leasing industries.

The size of the boards of directors also effects on the amount of financial experts serving on boards. Firms often are seeking for experts from the same industry. For example, it is expected from UPM-Kymmene to have a fair representation of agricul-

ture experts in their board, or from Nordea Bank to have a large representation of financial experts on their board. Bigger boards of directors are able to compose both the industry experts and experts from different fields. Smaller boards often do not have a big representation of experts outside of their industry, therefore, the size of the boards clearly dictates the amount of financial experts on the board of directors.

2.6 Hypotheses development

Hypothesis is defined as an explanation about a specific phenomenon in order to construe and to provide a guidance for further investigation (Black, & Champion, 1976, 126). In order that an hypothesis will be validated, it needs to be repeatedly tested. There are two possible outcomes out of hypothesis, proven and rejected hypothesis (Grinnell 1988, 200). Hence, the experiment aims to provide sufficient crediable data by the hypothesis testing (Hilborn, & Mangel 1997, 14-15). Kumar (2011, 83) states that an hypothesis is created in order to create an essence of the research and to increase the research objectivity.

This paper aims to explore a total of six hypotheses with the assistance of descriptive and inferential analyses that were performed in order to either reject or to accept the hypotheses.

Based on the literature review and empirical knowledge the following hypotheses have been formed:

H_1: Tangible assets do impact firms' debt for both short- and long-term;

H_2: R&D expenditure does impact firms' long-term debt but not the short-term debt;

H_3: Market value does impact firms' debt for both short- and long-term;

H_4: The presence of financial experts on the boards of directors does influence the procurement of debt favourably;

H_5: Board size positively correlates to market value;

H_6: Total debt positively correlates to tangible to intangible assets.

3   Methodology

This chapter presents the research design, followed by the data collection method and the definition of key variables, as well as the data analysis process and how it was implemented along with reliability and validity.

3.1   Research design

Saunders et al. (2009, 108) use the research "onion" framework in order to illustrate the various steps involved in the research process. The outer layer of the research "onion" is the research philosophies. The philosophy used in this research is positivism because it suits the thesis's purpose, as explained next. Positivism describes the stance of a natural scientist (ibid. 2009, 113, Bryman, & Bell, 2015, 28), meaning that the phenomena observed by the researcher will lead to formation of credible data. In this research it is implemented by collecting financial information and then analyzing it to represent the findings. Moreover, existing evidences were used to develop the hypotheses.

There are two main research approaches: deductive and inductive. The inductive approach involves the collection of data and the development of a theory as a result of the data analysis (Saunders et al. 2009, 124, Bernard, 2011, 7). This approach begins with observations, continues with the discovery of the patterns, and only then the theory is being made (Lodico, Spaulding, & Voegtle, 2010, 10). The deductive approach on the other hand, involves developing hypotheses or theories and then designing a research strategy to test them (Saunders et al. 2009, 124). This approach begins with a theory that leads the researcher to a new hypothesis that needs to be either confirmed or rejected. (Snieder, & Larner, 2013, 16). The deductive approach was chosen for this thesis since this research began with a theory, and only then the relevant methods were chosen and applied to test the hypotheses.

The quantitative approach as defined by Creswell (2014, 4), is a systematic examination of a phenomenon using statistical techniques. In this study, the quantitative approach was considered as the most suitable approach since it examines the relationships among numeric variables. The quantitative approach has

several major advantages. For example, the statistical analysis provides greater objectivity when reviewing the results, therefore, more credible results often arise from this type of research. Another advantage is that numerical results may be displayed in graphs and charts which often allows for better interpretation (Center for Innovation, 2018).

Saunders et al. (2009, 139) classify research purposes into three types: explanatory, exploratory, and descriptive. Explanatory research is conducted in order to define and characterize the cause and effect between variables. This research aims to determine whether the tangibility, R&D expenditure, market value and the presence of financial experts on boards of directors impact on firms' short- and long-term debt. Therefore, explanatory research is clearly the most suitable for this particular thesis.

An inner layer of the research "onion" are the different research strategies. The research strategy of the research falls under the experiment strategy. The purpose of the experiment strategy is to study causal links among variables. In other words, the experimental strategy helps to determine whether a change in the independent variable causes a change in the dependent variable (Saunders et al. 2009, 142). The experiment strategy suits this thesis since this research examines whether the independent variables (tangibility, R&D expenditure, market value and the presence of financial experts on boards of directors) causes a change on the dependent variables (short- and long-term debt).

3.2   Data collection

According to Ghauri, & Grønhaug (2002, 76), secondary data is data that was originally gathered for different objectives than the current research. At times, the secondary data provides sufficient information to reach the research objectives, hence, primary data, whose retrieval might be costly and time-consuming, might not be necessary (ibid. 78).

Nevertheless, when collecting secondary data, a researcher needs to keep in mind that the data was originally gathered for other purposes, and the information found

might not completely suit the existing research problem. Therefore, it has to be carefully analyzed for the relevance of the research problem. (ibid. 78-79).

For the purpose of this study, only secondary data was collected. The advantages of secondary data are that it provides a large amount of data over long periods with high precision, especially when quantitative data is being used. (Adams, 2014, 105).

For this research the OMXH25 was chosen. These 25 firms have the largest market value in Finland. Due to the different relationships financial firms have towards debt, they consider it as the regular operating system instead of considering it as a liability. It was decided to exclude the two financial firms from this research, and to conduct the analysis on the reminder 23 firms. The market value of the 23 firms are as follows: 8 are large-cap, 13 are mid-cap and 2 are small-cap. Information on 23 stocks included in this thesis can be found from appendix 1.

The financial information was collected from Nasdaq Nordic as well as from two stock market databases, Yahoo Finance and Euroland.com. The data obtained provided the historical stock prices at the end of years 2013-2016. Financial information such as tangible and intangible assets, current and non-current debt and operating profit were obtained from the chosen firms' 2013-2016 annual reports. The information regarding the education level and the work experience in the field of finance of the directors was collected from Bloomberg, as well as the firms' own corporate governance section.

After all the data was obtained, it was extracted into the form of Microsoft Excel spreadsheets. The data was then processed in SPSS and used for calculations that will be described in 3.4. Alongside the financial figures, journals, online articles and publications, websites and textbooks were the sources for the theoretical background and literature review chapter.

Telia Company's annual report figures are given in Swedish Krona. For this research, the currency was converted into euros with the conversion rate of 1 EUR = 9.84 SEK as of 22/01/2018.

3.3   Definition of key variables

In this subchapter, the key variables are defined and explained in order to provide a better understanding of the research.

Short-term debt (STD) represents any financial obligations that are due within one year. Short-term debt presented in a firm's balance sheet under "Current liabilities" (Nasdaq, 2017a).

Long-term debt (LTD) consists of loans and financial obligations that are to be matured in a greater than one year period. Long-term debt presented in a firm's balance sheet under "non-current liabilities" (Nasdaq, 2017b).

Total debt (TD) is the sum of short-term debt and long-term debt.

Board size (BS) is the amount of board members on the board of directors.

Average education (AvgEdu) is the average education per board which is measured according to: Bachelor's degree = 1 point, Master's degree = 2 points and Ph.D. = 3 points. Exclusively in the field of business.

Average experience (AvgExp) is the average years of experience per board. Exclusively in the field of finance.

Market capitalization (MarCap) is the total market value a firm is worth. It is calculated by multiplying the number of its outstanding shares by the current market price of a firm's shares (Nasdaq, 2017c).

Tangible assets (TanAssets) are any assets that have a physical form with clear purchase value (Oxford Reference 2018c).

Intangible assets (InTanAssets) are assets that can neither be seen nor touched, they vary among goodwill, intellectual property, copyrights, trademarks, patents, etc. (Oxford Reference, 2018d).

Tangible to intangible assets (TanToInTan) is the ratio between the amounts of tangible assets to intangible assets.

Return on assets (ROA) is an accounting ratio describing the amount of operating profit for a given year as a percentage of the assets of a firm (Oxford Reference, 2018e).

3.4 Data analysis

This paper includes several analyses. To each of these analyses, dependent, and independent variables were assigned. In this research there are three dependent variables: short-term debt (STD), long-term debt (LTD) and total debt (TD). In addition, there are eight independent variables: board size (BS), average education (AvgEdu), average experience (AvgExp), market capitalization (MarCap), tangible assets (TanAsset), intangible assets (InTanAsset), tangible to intangible assets (TanToInTan) and return on assets (ROA).

In this research, descriptive, correlation and regression analyses were performed with the help of SPSS statistics software in order to determine the relationships among the variables. The descriptive statistics provide the reader with a numerical overview of the research data set. This data set indicates the information concerning the number of observations, maximum value, minimum value, mean and standard deviation of the examined variables. In this case there are 92 observations during the years 2013-2016. Minimum and maximum stand for the extreme values of the variables, mean value stands for the arithmetic average, and lastly, standard deviation stands for the variance from its mean, and is a measure of the dispersion (Goos, & Meintrup, 2015, 68-69).

In addition to descriptive analysis, inferential analysis is as well presented in this paper. Inferential analysis is composed of correlation and regression analysis. The correlation analysis measures the relationship between two or more variables. The degree of the correlation may also be called correlation coefficient. For this study, it was decided to use the Pearson's product-moment coefficient for measuring the correlation coefficient. This measurement estimates the extent of linear regression between two variables. The range of Pearson's product-moment coefficient varies from -1 to +1, describing whether there is a positive relationship between the two variables, negative relationship between the two variables, or whether the two variables

does not correlate with one another. A value of +1 represents a total positive linear correlation, a value of 0 represents no linear correlation, and a value of -1 represents a total negative linear correlation (Lane, 2018). After all the collected data was imported into SPSS software, and "Bivariate analysis" was selected, the outcome given were the values of the correlation coefficients as presented in table 3.

The final analysis employed in this study is the multiple regression analysis. This analysis helps estimating the interrelation between a dependent variable to several independent variables (Montgomery et al. 2012, 1). The usage of the multiple regression analysis enables researchers to include various independent variables resulting in a clearer and more flexible outcome. The multiple regression model is acknowledged as a very practical procedure to enable the researcher to distinguish between the effects of the specific independent variables. Thus, the variables adjust to each other's effects and eliminate the unexpected effects (Dougerty, 2011, 152-155, Westhoff, 2013, 154-155).

The regression analysis measures several aspects. This study uses the test of significance in order to examine whether it is possible or not to reject the null hypothesis. Failing to reject implies that there is no linear relationship between the variables (Montgomery et al. 2012, 24). The significance denotes the risk of being a type 1 error when failing to reject the null hypothesis according to the following significance levels: 1%, 5% and 10%. These values correspond to the probability of observing an extreme value by chance (Statistics Yale, 2018, Mohr, 1990, 11-12). This paper contains both 1%, 5% and 10% as significance levels that reject the null hypothesis.

The multiple regression analysis examines, in addition to the test of significance, also the r-squared and the Durbin-Watson. The r-squared helps capturing the best fitted regression model. The values of r-squared range between 0-1 when higher values of r-squared indicate a better fit (Westhoff, 2013, 490).

When regression analysis is made, measurement errors and selection bias often occur (Schroeder et al. 1986, 8). The primary assumption of this model is that even though some errors are positive and others are negative and they may vary in size, the mean of the errors should be zero. If the mean is not zero, the data suffers from

autocorrelation, which refers to the case in which the residual errors terms from different observations are correlated (ibid.). The Durbin-Watson test tests whether any autocorrelations exists (Schroeder et al. 1986, 10). The values of Durbin-Watson range between 0-4, a value near to 0 indicates positive autocorrelation, a value near to 2 indicates non-autocorrelation, and a value near to 4 indicates negative autocorrelation (Brooks, 2008, 150).

3.5   Reliability and validity

Saunders et al. (2009, 156) define reliability as the extent to which data collection methods or analysis techniques provide consistent results for a similar data set. This can be evaluated by considering the whether a similar type of research will lead to identical results. Concerning this particular research, the findings are reliable because the methods employed in this research have been utilized by numerous researchers in a similar manner. Moreover, similar results could also be found by replacing the used variables with alternate ones. Another point to note is that the data was collected from reliable sources such as firms' own annual, and corporate governance reports. Also the chosen firms represent numerous industries with up to date data since all the data used in this research is during the years 2013-2016. Furthermore, the data collection methods and the analysis technique employed in this research were well explained in order to make it understandable for any reader.

Saunders et al. (2009, 157) define validity as the level of how well the findings represent what they were intended to. Validity may be classified into two types – external and internal validity (ibid.). External validity is the extent to which the results of a study can be generalized to a wider sample. To support the external validity in this research, a suitable sampling approach was applied when choosing the companies used in the analysis. A total of 23 top-tier Finnish firms formed a sum of 92 observations. The chosen 23 firms vary across industries, which helps avoiding the results of being generalized to a particular industry. To support the internal validity and to avoid common statistics flaws of the research results, the data for this study was carefully selected. The data was collected from published annual and corporate governance reports, as well as from Bloomberg and Reuters. Using such data demonstrates the credibility and trustworthiness of the study. Furthermore, since all the

firms are Finnish, they all follow similar rules and regulations which diminishes the likelihood for statistical flaws. Also, the determinants of debt that were hypothesized to influence the amount of short- and long-term leverage produced findings that were corresponding to the results expected, hence this research paper should be considered valid.

4   Research Results

This chapter presents the research results. First, the descriptive statistics are analyzed, followed by correlation analysis, and finally the regression analysis for both long-term debt, short-term debt and total debt.

4.1   Descriptive statistics

The mean of long-term debt is 1.38 billion euros, and the mean of short-term debt is 360 million euros, totaling debt mean with 1.74 billion euros. The mean market capitalization is 6.55 billion euros, with tangible assets of 2.56 billion euros and 0.99 billion of intangible assets. This data set implies that top-tier Finnish firms that own substantial amount of market capitalization and tangible assets, issue considerably much more long-term debt than short-term debt. Furthermore, the data set certifies clearly that most firms own abundant tangible assets in relation to their intangible assets, which makes the claim that intangible assets support debt irrelevant, as it is widely known that tangible assets supports debt better than intangible assets.

The minimum of return on assets is negative, meaning that at least one firm completed a calendar year with less returns than its total assets. However, the mean of return on assets is 9.4%, meaning that in average, firms have more returns than their total assets. Both short-term debt and long-term debt have relatively high standard deviation. These results indicate that short-term debt and long-term debt figures were significantly different from one another. Such results may be explained by the fact that the chosen firms involved in this analysis are heterogeneous. These firms are significantly diversified because the OMXH25 is composed of small, mid and large cap firms. Moreover, the standard deviation of market capitalization is relatively high. This indicates again how significantly different figures across firms are. Such

high standard deviation for market capitalization may explain the reason why the minimum and maximum of long-term debt, short-term debt and total debt vary so much.

Table 2 - Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
LTD	92	16,000,000	9,313,600,000	1,388,995,569	2,105,404,575,431
STD	92	600,000	3,376,000,000	360,106,066	498,989,566,135
TD	92	67,000,000	10,315,752,033	1,748,891,528	2,471,985,694,963
BS	92	5	12	8.065	1.451
MarCap	92	543,244,011	38,510,871,378	6,557,245,739	8,137,736,646
TanAsset	92	82,200,000	13,113,000,000	2,568,244,802	2,831,184,587
InTanAsset	92	18,000,000	10,960,000,000	990,011,024	1,911,197,915
ROA	92	-,058	,539	,0941	,0979

4.2 Correlation analysis

Table 3 presents the level of correlation between the following variables: long-term debt, board size, average education, average experience, market capitalization, tangible assets, intangible assets, tangible to intangible assets ratio, and return on assets. The range of the correlation analysis varies between -1 to +1. When the figure is closer to -1, it expresses strong negative correlation, when the figure is closer to 0, it expresses very weak correlation, and when the figure is closer to +1, it expresses strong positive correlation. The denotations of * and ** represent $0.1 < p < 0.5$, and $0.5 < p$ levels of correlations respectively.

Long-term debt is strongly correlated with board size (0.569), market capitalization (0.568) and tangible and intangible assets (0.768 and 0.661 respectively). On the other hand, long-term debt is weakly negatively correlated with average education (-0.168) and return on assets (-0.163). This data set implies that long-term debt is dependent of many aspects, and if a firm lacks only one of the strongly correlated determinants, it may not affect long-term debt significantly. Moreover, board size is correlated with market capitalization (0.438), tangible and intangible assets (0.299 and 0.587 respectively), and negatively correlated with tangible to intangible assets ratio. This data set confirms the relationship between bigger boards of directors with

higher market capitalization. Lastly, market capitalization is correlated with both tangible and intangible assets (0.371 and 0.623 respectively). These results support the argument that wealthier firms own large amounts of tangible and intangible assets.

Table 3 - Correlation Coefficient

	LTD	BS	AvgEdu	AvgExp	MarCap	Tan Asset	InTan Asset	TanTo InTan	ROA
LTD	1,000	,569	-,168	-,041	,568	,786	,661	,029	-,163
BS	,569	1,000	-,051	-,159	,438	,299	,587	-,356	-,047
AvgEdu	-,168	-,051	1,000	-,166	-,067	-,050	-,038	-,190	,072
AvgExp	-,041	-,159	-,166	1,000	-,053	,125	-,173	,157	-,015
MarCap	,568	,438	-,067	-,053	1,000	,371	,623	-,131	-,041
TanAsset	,786	,299	-,050	,125	,371	1,000	,245	,291	-,203
InTanAsset	,661	,587	-,038	-,173	,623	,245	1,000	-,247	-,118
TanToInTan	,029	-,356	-,190	,157	-,131	,291	-,247	1,000	-,119
ROA	-,163	-,047	,072	-,015	-,041	-,203	-,118	-,119	1,000

Note: * 0.1 < p < 0. 5; ** p > 0. 5
Number of observations N = 92.

4.3 Regression analysis - Long-term debt

In tables 4-6, the regression analysis is presented for long-term debt, short-term debt and total debt respectively. The denotations of *, ** or *** represent the 10%, 5% and 1% significance levels respectively. The figures in these tables for each interrelation are based on its significance level. The lower the figure, the higher the likelihood the results have not occurred by chance. In other words, if the figure is under 10%, it is considered significant. Furthermore, if r-squared is closer to 1, the better the regression line fits the data, and if Durbin-Watson value is near 2, it indicates no autocorrelation.

Table 4 presents the effect of the independent variables on long-term debt. This analysis clearly indicates that tangible and intangible assets, average education, board size and the tangible to intangible assets ratio are strongly associated with long-term debt. On the other hand, return on assets that falls just below the significance level, as well as, Market capitalization and average experience are insignificant in relation to long-term debt.

The r-squared in this regression model lays on .906. Such a high r-squared suggests that this model fits very well with the data. The Durbin Watson test was 1.851. A figure that close to 2 suggests that the data did not suffer from any autocorrelation.

Table 4 - Regression analysis – Long-term debt

Dependent variables	Significance
(Constant)	,000***
Tangible Assets	,000***
Intangible Assets	,000***
Average Education	,000***
Board Size	,000***
Tangible To Intangible Assets	,040**
Return On Assets	,153
Market Capitalization	,701
Average Experience	,835
R Squared	,906
Durbin-Watson	1,851

Note: *** $p < 0.01$; ** $p < 0.05$; * $0.05 < p < 0.1$

4.4 Regression analysis - Short-term debt

Table 5 presents the effect of the independent variables on short-term debt. Unlike long-term debt, short-term debt is strongly associated only with tangible assets and market capitalization. Return on assets, which also in this table is just over 10%, differently from table 4, is considered associated with short-term debt, and will be observed along with tangible assets and market capitalization. According to this model, short-term debt has numerous insignificant independent variables. Average education, intangible assets, tangible to intangible assets ratio, board size and average experience are not associated with short-term debt.

The r-squared in this regression model lays on .439. An r-squared value of .439 suggests that this model fits moderately well with the data. The Durbin Watson test was 2.012. A figure that close to 2 suggests that the data did not suffer from any autocorrelation.

Table 5 - Regression analysis – Short-term debt

Dependent variables	Significance
(Constant)	,674
Tangible Assets	,000***
Intangible Assets	,005***
Average Education	,126*
Board Size	,307
Tangible To Intangible Assets	,509
Return On Assets	,547
Market Capitalization	,707
Average Experience	,829
R Squared	,439
Durbin-Watson	2,012

Note: *** $p < 0.01$; ** $p < 0.05$; * $0.05 < p < 0.1$

4.5 Regression analysis - Total debt

Table 6 presents the effect of the independent variables on total debt. Total debt consists of both long-term and short-term debt, therefore, this model indicates which independent variables are associated with the combination of the two. This analysis clearly indicates that tangible and intangible assets, average education and board size are strongly associated with total debt. As previously mentioned, these four independent variables are also strongly associated with long-term debt. Due to the significant role long-term debt has on total debt, we may learn why long-term debt and total debt share similar determinants. On the other hand, the tangible to intangible assets ratio, which was also significant to long-term debt is insignificant to total debt. Moreover, market capitalization and return on assets which are significant to short-term debt, are insignificant to total debt.

The r-squared in this regression model lays on .846. Such a high r-squared suggests that this model fits with the data very well. The Durbin Watson test was 1.916. A figure that close to 2 suggests that the data did not suffer from any autocorrelation.

Table 6 - Regression analysis – Total debt

Dependent variables	Significance
(Constant)	,091
Tangible Assets	,000***
Intangible Assets	,000***
Average Education	,007***
Board Size	,091*
Tangible To Intangible Assets	,202
Return On Assets	,255
Market Capitalization	,360
Average Experience	,748
R Squared	,846
Durbin-Watson	1,916

Note: *** $p < 0.01$; ** $p < 0.05$; * $0.05 < p < 0.1$

5 Discussion and Conclusions

This chapter summarizes the results of the analysis performed in order to answer the research questions and compare them with the predefined hypotheses. In Addition, this chapter also explains the practical implications and limitations of the study along with recommendations for future research.

5.1 Summary of the key findings

The main goal of this research was to determine whether tangible assets, R&D expenditure, market value and the presence of financial experts on boards of directors impact firms' debt. This was done by looking for relationships between the dependent variables and the independent variables. To conclude the key findings of the research, the research questions are individually answered, and the hypotheses are accepted or rejected.

1. Do the tangible assets impact firms' debt (both, short- and long-term)?

H₁: Tangible assets do impact firms' debt for both short- and long-term.

The correlation coefficient of long-term debt together with tangible assets is 0.786, proving that there is a strong positive correlation between long-term debt and tangi-

ble assets. To further support that both long- and short-term debt and tangible assets are positively correlated, the regression analysis generated a level of significance that individually measures tangible assets with long-term debt, short-term debt and total debt. The results were 0%, 0%, 0% respectively. As previously mentioned, if the level of significance is 0%, it is proven that the alternative hypothesis can be rejected, and therefore the variables are strongly positively associated. These results support prior studies that tangible assets support debt. Tangible assets may serve as collateral and lenders feel more secure issuing debt to firms with ample tangible assets.

Based on both correlation and regression analysis, it is proven that there is a strong positive correlation between both long- and short-term debt and tangible assets, and therefore the hypothesis is accepted.

2. Does the R&D expenditure impact firms' debt (both, short- and long-term)?

H_2: R&D expenditure does impact firms' long-term debt but not the short-term debt.

The correlation coefficient of long-term debt together with intangible assets is 0.661, proving that there is a strong positive correlation between long-term debt and intangible assets. To further support that long-term debt and intangible assets are positively correlated, the level of significance of the two variables was 0%, proving that the alternative hypothesis can be rejected, and consider long-term debt and intangible assets strongly positively associated. On the other hand, short-term debt has a level of significance of 0.509. As previously mentioned, if the level of significance exceeds 10%, the alternative hypothesis cannot be rejected, and therefore it is impossible to certify that short-term debt and intangible assets are correlated. These results support prior studies that intangible assets support long-term debt because they support the repayment of debt and can potentially serve as collateral. Moreover, intangible assets are non-current assets and they cannot generate income in short times, and therefore they do not support short-term debt.

Based on both correlation and regression analysis, it is proven that there is a strong positive correlation between long-term debt and intangible assets. Moreover, this research cannot prove a correlation between short-term debt and intangible assets. Therefore, the hypothesis is accepted.

3. Does the market value impact firms' debt (both, short- and long-term)?

H₃: Market value does impact firms' debt for both short- and long-term.

The correlation coefficient of long-term debt together with market capitalization is 0.568, proving that there is a strong positive correlation between long-term debt and market capitalization. However, the regression analysis generated a figure of 0.701 level of significance. Because this research analyzed a sum of 92 observations, which is a very large sample size, it is safe to rely only on the correlation coefficient rate, and claim that long-term debt is positively correlated with market capitalization. In addition to long-term debt, short-term debt has a level of significance of 0.005. Level of significance at that rate proves that the alternative hypothesis can be rejected, and therefore the variables are strongly positively associated. These results support prior studies that wealthier firms issue more debt. Wealthier firms often own more tangible assets that may serve as collateral to reduce the risk from lenders. Furthermore, for a wealthier firm the likelihood to get bankrupt is drastically lower than less wealthier firms because countries often assist firms with bailouts (for example, General electric, and JP Morgan Chase after the 2008 financial crisis). Another reason why wealthier firms tend to issue more debt may be because lenders seek for safer borrowers even with less favorable debt conditions.

Based on both correlation and regression analysis, it is proven that there is a strong positive correlation between long- and short-term debt with market value, and therefore the hypothesis is accepted.

4. Does the presence of financial experts on the boards of directors influence the procurement of debt favorably?

H₄: The presence of financial experts on the boards of directors does influence the procurement of debt favourably.

The correlation coefficient of long-term debt together with average experience is negative 0.041, proving that there is no correlation between long-term debt and average experience. To further support that both long- and short-term debt and average experience are not correlated, the regression analysis generated a level of significance that individually measures average experience with long-term debt, short-term

debt, and total debt. The results were 0.835, 0.829, and 0.255 respectively. As previously mentioned, if the level of significance exceeds 10%, the alternative hypothesis cannot be rejected, and therefore it is impossible to certify that the variables are positively associated. The results given are very surprising because they oppose prior studies. It is expected by the financial experts to be willing to issue more debt due to their experience in the field, and their knowledge of tax benefits. However, most directors have gone a long way in top positions prior to being directors, and have gained long experience concerning issuing debt, which might explain why there is no correlation between debt and the presence of financial experts on the boards of directors.

Based on both correlation and regression analysis, it is proven that there is no correlation between long- and short-term debt and the presence of financial experts on the boards of directors, and therefore the hypothesis is rejected.

In addition to the main hypotheses, 2 other hypotheses were developed and are tested individually:

H_5: Board size positively correlates to market value.

The correlation coefficient of board size together with market capitalization is 0.438, proving that there is a fairly strong positive correlation between board size and market capitalization. This result may explain that wealthier firms tend to assign more directors to their boards, and that wealthier firms are often more complex and therefore in need for bigger boards.

Based on correlation analysis, it is proven that there is a fairly strong positive correlation between the board size and market capitalization, and therefore the hypothesis is accepted.

H_6: Total debt positively correlates to tangible to intangible assets.

The regression analysis of total debt with tangible to intangible assets ratio is 0.202. When the level of significance rate exceeds 10%, it does not consider significant. The result is that the alternative hypothesis cannot be rejected, and therefore total debt and tangible to intangible assets ratio cannot be not considered correlated. This result is different than expected. As tangible assets are well known for impacting

debt, and intangible assets are not well known for impacting short-term debt, the assumption was that total debt should be positively associated with tangible to intangible assets ratio. This result may be explained by the decision of choosing top-tier Finnish firms, with ample tangible and intangible assets, up to a point that their ratio does not affect total debt.

Based on regression analysis, it is proven that there is no correlation between total debt and tangible to intangible assets ratio, and therefore the hypothesis is rejected.

5.2   Practical implications

Capital structure has been one of the major research topics in recent years. Organizations and researchers have tried for years to find an optimal capital structure by conducting numerous papers about this topic. There have been mixed results on the evidence of the factors influencing the capital structure of a firm. This particular research contributes to an already extensive literature that exists on capital structure. However, the results are particularly important concerning top-tier Finnish firms.

The results of this research are particularly useful for corporations. By acknowledging these results, firms might be able to compose a more suitable capital structure. Also, corporations might learn from this research to take advantages of being in their position. Firms might issue more debt in favoring conditions due to having large sums of tangible assets, and or by having high market value.

Furthermore, the results of this paper could be of interest for majority shareholders. As many studies proved the importance of a well-functioning boards of directors, this research has several new points of view concerning the composition of the boards. The main finding is that financial experts with many years of experience behind them do not affect how levered a firm is. In other words, shareholders should not necessarily seek for financial experts over experts in other fields of expertise. Another point of view that can be taken from this paper is that wealthier firms tend to have bigger boards. That fact might be related to the reason that wealthier firms are often more complex and are composed of more departments than smaller firms usually are.

Lastly, the outcome of this research may be of interest to researchers in the field of finance in particular and business in general. This paper provides additional findings that are of importance to reach more accurate predictions on the determinants of short- and long-term debt.

5.3 Limitations and recommendations

There are several limitations to this research, mainly due to lack of time, money, and other resources. Firstly, the sample of this research incorporated 23 firms. Overall, the research covers a very large range of industries, however, when only one firm represents a whole industry, it undermines the reliability of this particular industry's results (see appendix 1). Also, the likelihood of one well represented industry to enjoy a bull period or suffer from a bust period and critically tilt the averages is possible.

Secondly, measuring leverage cannot be observed similarly among firms. Some firms seek for expansion and might need additional funds, while some firms might have sufficient funds without having to issue new debt. Furthermore, some firms might be satisfied with their current operations, while others constantly be looking for expansions, which may require additional debt. Also, different firms and individuals experience different relationships towards debt, which might explain why firms' capital structure varies so much.

Thirdly, there is the need to be aware of the possibility of p-hacking. This means that when collecting a large number of random variables and checking for correlations, there is a statistical probability that strong correlations will be found simply because many pairs have been tested.

Lastly, the sample taken for this research represents a very small proportion of the actual total population, and may not be big enough to show completely accurate results, which can be generalized.

However, regardless of the aforementioned limitations, this research provided statistically significant results that can be tested with similar sample and verified by using other methods, keeping the basic assumptions constant.

The recommendations for future research resulting from the limitations are as follows. Firstly, as previously mentioned, although there is a total of 92 observations, there are only 23 different capital structure approaches. Perhaps next research could be made with 92 firms over a life span of one year.

Secondly, supporting studies could be made by using the data prior to the 2008 financial crisis. It might add to the whole picture of capital structure as of pre-financial and post-financial crisis. Lastly, this research focused on four determinants of leverage (tangibility, R&D expenditure, market value and the presence of financial experts on the boards of directors). A supporting research might incorporate more determinants of leverage such as insolvency costs, level of growth, firms with more volatile earnings and profitability.

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Appendices

Appendix 1.   Information of the 23 selected stocks.

Company name	Stock code	Industry	Cap size
Amer Sports Oyj	AMEAS	Consumer Goods	Mid cap
Cargotec Oyj	CGCBV	Industrials	Mid cap
Elisa Oyj	ELISA	Telecommunications	Mid cap
Fortum Oyj	FORTUM	Utilities	Large cap
Huhtamäki Oyj	HUH1V	Industrials	Mid cap
Konecranes Oyj	KCR	Industrials	Mid cap
Kesko Oyj B	KESKOB	Consumer Services	Mid cap
Kone Oyj	KNEBV	Industrials	Large cap
Metsä Board Oyj B	METSB	Basic Materials	Mid cap
Metso Oyj	METSO	Industrials	Mid cap
Neste Oyj	NESTE	Oil & Gas	Large cap
Nokia Oyj	NOKIA	Technology	Large cap
Nokian Renkaat Oyj	NRE1V	Consumer Goods	Mid cap
Orion Oyj B	ORNBV	Health Care	Mid cap
Outotec Oyj	OTE1V	Industrials	Small cap
Outokumpu Oyj	OUT1V	Basic Materials	Mid cap
Stora Enso Oyj R	STERV	Basic Materials	Mid cap
Telia Company	TELIA1	Telecommunications	Large cap
Tieto Oyj	TIE1V	Technology	Small cap
UPM Kymmene Oyj	UPM1V	Basic Materials	Large cap
Valmet	VALMT	Industrials	Mid cap
Wärtsilä Oyj abp	WRT1V	Industrials	Large cap
YIT Oyj	YIT	Industrials	Small cap