Determinants of Capital Structure

An Empirical Study on Swedish FinTech Firms

MARTIN SKÅLANDER

LOVE CLAESSON

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Abstract:

This paper aims to examine the determinants of capital structure and its effect on Swedish FinTech firms. The theoretical framework used is the trade-off theory and the pecking-order theory. Three different regression models were used on panel data to test which factors impact the types of leverage ratios of firms, as well as if there are any differences between long-term debt and short-term debt. The factors examined were size, profitability, liquidity, non-debt tax shield, age, intangibility, risk, growth, and if the firm is located in a major city or not. The study concludes with significance as firms get bigger, more profitable, have higher non-debt tax shields, and are located in major cities, have higher ratios of long-term debt and short-term debt. For firms that are more liquid and have more tangible assets, long-term debt is increased while short-term debt is decreased. The findings support both the trade-off theory and the pecking order theory.

Keywords:

Capital Structure, Pecking Order Theory, Trade-off Theory, Sweden, FinTech

Authors:

Martin Skålander (24755)
Love Claesson (24754)

Tutor:

Ye Zhang, Assistant Professor, Finance Department

Examiner:

Adrien d'Avernas, Assistant Professor, Finance Department

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Introduction

For the later part of the past century, researchers and practitioners have been developing theories explaining the financial ratio of debt to asset ratio, referred to as the capital structure. The study of capital structure is of great practical interest due to its real implications for the vast number of operating businesses.

The research area was initiated by Modigliani and Miller's work *The Cost of Capital, Corporation Finance and the Theory of Investment*, published in 1958. Building on their findings, researchers have developed several theories trying to explain what determines capital structure. Although there is no universal theory, some theories have been getting more recognition than others. Two of the main theories are the Pecking-Order Theory developed by Myers 1984 in *The Capital Structure Puzzle,* and the Trade-Off Theory by Kraus and Litzenberger 1973 in *A State-Preference Model of Optimal Financial Leverage.* These theories maintain the foundation for major research papers over the last 40 years (Kumar et al. 2017).

The significant interest in this area of research is justified since an appropriate capital structure allows companies to maximize their value. Although the financial structure does not create value in itself, it allows firms to maximize benefits and minimize costs associated with the different financing alternatives. Hence, choosing the capital structure can be seen as an important strategic decision. Nevertheless, it is not a straightforward task to determine the most appropriate capital structure for a firm, as the mixture of equity and debt results in various impacts on different firms. This is because the determinants and effects are dynamic in nature. They are both firm and industry-specific, as well as influenced by the firm's micro and macro-economic environment.

This study aims to map out the determining factors of capital structure and test predictions made by the pecking order and trade-off theory. Many studies have been conducted on these different aspects. In order to contribute to the large literature on the determinants of capital structure, the aim of our study is to focus on the novel and less frequently studied industry of financial tech in Sweden, also known as FinTech.

One challenge in studying this industry regards the definition of FinTech. Meta-studies on FinTech do not support any consensus on the definition of the term (Schueffel, 2016). For this study to be meaningful and comparable, the definition used must be precise and consistent. As a foundation, this paper uses the same definition as Tillväxtanalys, which is a government authority that belongs to the Swedish Ministry of Trade and Industry. Their definition is based on the Financial Stability Board (FSB) and Basel committee, who define FinTech as *technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions, and the provision of financial services.* FinTech firms can be further categorized into different categories such as consulting, payments, insurance, etc. (Tillväxtanalys, 2020). However, this paper will cover the whole industry rather than the different subcategories.

Based on common determinants of past studies, we have used nine independent variables as determinants of three different measurements of capital structure. Capital structure is measured as total debt to assets, long-term debt to assets, and short-term debt to assets. The independent variables are size, liquidity, profitability, the intangibility of assets, firm age, non-debt tax shields, growth, risk, and firm location.

The empirical results provide the following significant findings. Seven independent variables correlate significantly with the different kinds of capital structures in the firms we studied. Liquidity and asset structure have a negative correlation with the short-term and total debt to asset ratio while having a positive correlation with the long-term debt to asset ratio. Non-debt tax shields and profitability are positively correlated with every debt level measured. Size and being located in a major city are positively correlated with the total debt to asset ratio and short-term debt to asset ratio but are not significant determinants for the long-term debt to asset ratio. Growth is positively correlated with the short-term debt to asset ratio but is not a significant determinant of the long-term and short-term debt to asset ratio.

To conclude, total debt to assets has four significant correlations that are aligned with the trade-off theory, whereas two significant results are aligned with the pecking-order theory predictions. For the total debt to asset ratio, we see that the trade-off theory provides more explanatory value. Long-term debt to assets has two significant correlations aligned with the trade-off theory predictions and two significant results aligned with the pecking order theory. Thus, for the long-term debt to asset ratio, both theories seem to provide equal explanatory value. The short-term debt to asset ratio has four significant results aligned with the trade-off theory while three of the significant results are aligned with the pecking order theory. Hence, the trade-off theory slightly provides more explanatory value for short-term debt to assets.

One of the closest relevant papers in the field of FinTech is conducted by Kedzior et al. (2020) who studied the determinants of capital structure among Polish-listed technology firms. Our paper shares the same dimensions regarding the use of a theoretical foundation, panel data, and a regression analysis. However, our thesis differs in several ways. They investigate New Technology-Based Firms (NTBF), ventures that are less than 25 years old and supply a product or service based on an invention or technological innovation. Thus, focusing on the industry of FinTech targets firms offering financial solutions, which is a narrower firm definition than the one used in their study. They measured six out of our nine independent variables including size, liquidity, intangibility, age, profitability, and growth, whereupon we also measured NDTS, asset structure as well as the impact of being located in a major city.

In contrast, Kedzior et al. (2020) measured innovativeness. We have opted not to measure this variable due to the limitations of available data in these variables. That is, very few of our sample size report notable R&D costs, capital expenditure costs, or externally acquired intangible assets. When comparing the findings of Kedzior et al. (2020) and this study, several differences can be distinguished. They received significant correlations in internal and external innovativeness, age, and liquidity, whereas this paper found significant correlations in size, liquidity, geographical area, profitability, growth, asset structure, and non-debt tax shields. The differences in the results can be seen because there might be country-specific or industry-specific factors affecting the results. In this manner, our paper will contribute to the current literature by extending the research area to the field of financial tech.

This paper contributes to the following strands of literature. First, major papers targeting the determinants of capital structure in the FinTech industry are lacking. To our best knowledge, there are none. Traditionally, papers have focused on industries like manufacturing, banking, and real estate (Kumar et al, 2017). Therefore, the objective of this paper is to fill this gap in the literature and provide insights into the factors specific to the FinTech industry. Due to the innovative solutions that the FinTech industry provides, which commonly lead to disrupting effects on society, it is an important contribution to the existing literature.

Secondly, existing literature has mainly focused on either large, developed economies such as Germany, Spain, France, Italy, the USA, and the UK, or developing economies in Africa and Asia-Pacific. Thus, this paper will extend the current literature by focusing on determinants of the capital structure of Swedish firms. Sweden is of interest to examine due to its reputation of being one of the most innovative countries globally. According to the European and Regional Innovation Scoreboard 2021, Stockholm is the most innovative region in Europe, which is also where 65% of the Swedish FinTech firms are registered (Tillväxtanalys, 2020). In the same manner, according to Bloomberg Innovation Index 2021, Sweden has a fifth place in the world's most innovative economies.

Thus, it is of special interest to examine this matter in a country with a track record of a high number of successful FinTech firms (Tillväxtanalys, 2020). There are several examples of Swedish FinTech companies developing products essential for the country's technological infrastructure. For instance, BankID is a FinTech product that has enabled many further innovations by facilitating a secure identification process. Moreover, another case is Klarna which has developed easier payment solutions and has expanded internationally, making online purchases more accessible and efficient for customers worldwide. Since these firms have an immense impact on our society, the industry is of great interest to study.

In terms of method, most papers in this field of research include common content and structure. They include a theoretical base, data gathering, and a regression model. These dimensions will be covered in this paper. First, we obtained data for a large sample of FinTech firms in Sweden for the years 2018 to 2020 through the database Retriever Business. The general approach taken in previous empirical work is to construct regression equations with proxies for the different variables. Thus, proxies for nine independent variables were constructed based on the best practices used in past studies on this subject. Thereupon, two contradictory hypotheses were constructed for each independent variable in line with the differences in predictions made by the trade-off theory and the pecking-order theory. We adjusted the extreme outliers through the practice of winsorizing and tested the data for multicollinearity. Thereafter, we ran multiple regression models based on ordinary least squares (OLS). We measured the correlation between the three different types of leverage, and the nine independent variables including size, liquidity, profitability, asset structure, age, non-debt tax shield, growth, and risk. Although not all variables had significant p-values, all variables could be interpreted according to our theoretical foundations. In the empirical analysis, we have also discussed the different correlations between the long-term, short-term and total debt in the leverage ratio.

The remainder of this paper is organized as follows. Section I presents the institutional background. Section II reviews the theories of capital structure and literature for the determinant factors of capital structure. Section III describes the methodology and data. Section IV reports the empirical results. Section V analyses the empirical outcome. Section VI discusses and highlights limitations whereupon Section VII concludes.

Section I. Institutional Background

In this section, the main research paper about FinTech in Sweden will be presented. The two fundamental papers are written by Tillväxtanalys (2020) and the Swedish FinTech Association (2021). Both papers conclude that there are 450 active FinTech firms in Sweden. The data shows that most firms have 11-50 employees. According to the Commission Recommendation (2003) by the European Union concerning the definition of micro, small and medium-sized enterprises, these firms are classified as small.

Both Tillväxtanalys (2020) and Swedish FinTech Association (2021) state that raising capital is one major challenge for FinTech firms. Although 50% of the firms managed to raise capital externally under 2020, most of the money was raised by larger firms. It is established that FinTech firms are eager to get funding to support high-growth scalable solutions. This is aligned with the reported fact that FinTech firms have a hard time raising capital since these firms are often very risky. As a result, 50% of the companies state that they need to raise funds in the upcoming year. 96% of the firms that urged funding were firms that had 50 employees or less. To conclude, it seems that the larger firms are relatively raising the most funds, although the relatively smaller firms are most eager to raise funds.

One significant finding of the study of FinTech firms is their sensitivity to the financial infrastructure. The FinTech firms must have registered business accounts at one of the four major banks in Sweden to operate. This poses a major risk as there have been reports of closed accounts even when the firms have approval from the government to operate (Tillväxtanalys, 2020; Swedish FinTech Association, 2021). Others have also reported that they are denied using Bank-ID due to this rejection of the business account. This makes it harder for FinTech firms to operate since this poses a significant risk. It furthermore disproportionately affects start-ups that work with blockchain or cryptocurrencies. To conclude, smaller firms are more threatened by regulations than larger firms.

Regarding geography, 65% of the FinTech firms are located in Stockholms län, 12% in Västra Götalands län and 8.7% in Skåne län, whereas 14.3% are in other counties Tillväxtanalys (2020). This means that 85.7% of the FinTech firms in Sweden are in counties where the three biggest cities are situated, Stockholm, Gothenburg, and Malmö.

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Section II - Determinants of Capital Structure and Theories

In this section, the theories of capital structure, as well as the determinants of capital structure, are presented. First, the trade-off theory and the pecking order theory will be presented in the mentioned order. Secondly, the firm characteristics that will be examined in this study are presented. This will include a presentation of the dependent variables, independent variables, their proxies, and hypotheses regarding the theories' predictions about correlations. This section will be summarized in Table I which includes hypotheses, theories, and proxies.

II.I Theories

The trade-off theory and pecking order theory were an extension of Modigliani & Miller's (1958) work. Modigliani & Miller (1958) stated that a firm's capital structure does not affect its market value in case of perfect market conditions. However, perfect market conditions do not reflect the actuality of the financial markets, including taxes, information asymmetry, bankruptcy costs, and agency costs. Therefore, the trade-off theory and pecking order theory extended this strand of literature and adjusted the models to more accurately represent real-world conditions. The first theory presented is the trade-off theory, thereupon the pecking order theory. Since these studies are well established, we have chosen to use them as foundations for the hypotheses of this study.

Trade-off theory

The trade-off theory describes a firm's capital structure as a dynamic value dependent on the costs and benefits produced by issuing debt and equity. The appropriate capital structure is the one that maximizes the value of the firm by balancing marginal costs with marginal benefits.

The classic version of the trade-off theory was instituted by Kraus & Litzenberger (1973). It was an extension of Modigliani & Miller's (1958) work since they did not consider the increased bankruptcy costs that debt provides. Kraus & Litzenberger (1973) argued that there are two kinds of bankruptcy costs, direct and indirect. Direct costs are associated directly with bankruptcy, such as legal fees and liquidation costs. Indirect bankruptcy costs are indirectly associated indirectly with bankruptcy. One example is when other firms are less likely to want to engage in business relations with a firm at a high risk of going bankrupt. This

also includes customers that rather seek alternative companies that are safer (Kraus & Litzenberger, 1973).

The optimal capital structure is dynamic since there are also benefits of debt in regard to equity. The benefits reside mainly in the interest tax shield while the costs are seen mainly in the financial distress costs (Kraus & Litzenberger, 1973; Graham & Harvey, 2001). The tax shield benefits arise due to interest payments being tax-deductible, effectively reducing the earnings tax a profitable company must pay (Modigliani & Miller, 1963). This offers an incentive for taking up more debt to reduce tax costs. Another benefit of issuing debt is the credible signaling caused by a firm committing to taking on future interest payments. This indicates that the management believes that the firm has the ability to cover future interest payments (Ross, 1977).

The theory has been further developed to include the agency costs of issuing debt and equity (Jensen & Meckling, 1976; Harris & Raviv, 1990). These agency costs are constituted by conflicts of interest between principals and agents and their impact on the capital structure. There are two types of agency costs, between firm owners and management and creditors and management (Jensen & Meckling. 1976). This is because managers might prioritize financial stability rather than the return for the owners. There might also be conflicts with the creditors resulting from the disclosure of less accurate financial information (Jensen & Meckling, 1976).

Pecking order theory

The pecking order theory was initially presented by Donaldson's (1962) study of financing practice whereupon it was popularized and modified by Myers & Majluf (1984). The argument is based on dividing the sources of financing into internal and external sources. The theory states that firms prefer internal rather than external financing due to the lower informational asymmetry between financiers and management. For this reason, the theory is an extension of Modigliani & Miller's assumption regarding perfect information. (Frank & Goyal, 2003)

Asymmetric information arises since external actors know that the internal management has superior knowledge about the financials of the firm, including risk and opportunities. For example, if the firm issues new equity, it will signal to the market that it is either overvalued or does not have the financial capabilities to take on debt. The external investors will then require a discounted price for the equity. Therefore, a firm that is undervalued will be affected negatively and will therefore avoid issuing new equity. The asymmetric information exists between companies, banks, and external investors. Banks and external investors have more difficulties accessing the true information about the companies compared to the people operating within its structure, hence will require higher interest rates on loans or rates of return (Myers & Majluf, 1984).

The consequences of asymmetric information lead to problems regarding moral hazard and adverse selection. Moral hazard refers to the fact that owners benefit more from taking on risky investments compared to debtors (Kedzior et al. 2020). Therefore, the external investors require additional safety in terms of return rates or interest rates to cover this risk. The adverse selection problem stems from the fact that external parties including investors and banks have difficulties distinguishing between effective and ineffective investment projects. In the same manner, this generates extra costs for the firm that wants funding externally.

The pecking-order theory suggestion is not based on an optimal ratio between debt and equity, instead, the proposition made by Myers & Majluf (1984) is that firms should structure the financing sources in a pecking order as follows; internal financing, new debt, and new

equity. Therefore, a firm that follows a pecking order is one that prefers internal financing over external, preferring debt to equity in cases where external financing is used.

II.II Determinants of Capital Structure

The determinants of capital structure have been identified and motivated based on prior studies in this research area. First, the dependent variable, leverage, will be presented with three different proxies that the study will use. Thereupon, the expected determinants of capital structure will be presented in the following order: size, liquidity, profitability, intangibility, age, non-debt tax shield, growth, risk, and if the firm is located in a major city.

Dependent variable

Leverage

Measuring leverage is often less straightforward than researchers assume (Welch, 2011). Since the definition of leverage has a direct effect on the result of the entire regression analysis, it is important to choose the appropriate measurement. In order to construct a proxy of leverage, debt and equity must be defined. We have chosen to measure leverage as debt over total assets, using three different kinds of debt.

The three main methods of measuring debt are short-term debt, long-term debt, and total debt (Rajan & Zingales, 1995). It is of interest to examine if there are any differences between long and short-term debt. Thus, this study will examine the determinants of capital structure for total debt, long-term debt as well as short-term debt, using these three proxies as measurements for leverage. The definition of short-term debt is debt that should be repaid within one year. The definition of long-term debt is a maturity of above one year.

One highlighted method of measuring equity is using the market value of equity (Kieschnick & Moussawi, 2018). However, our sample size consists of mostly non-listed companies, this only allows us to use the book values. Since the summary of debt and the book value of equity equals total assets, leverage will be measured as the book value ratio of debt to total assets. This measurement is also supported by other studies (Rajan & Zingales, 1995). The proxies of leverage that have been selected in this paper are total debt over total assets, long-term debt over total assets, and short-term debt over total assets.

Although the hypotheses constructed will be based on what the trade-off and pecking order theory suggest about leverage with total debt as a proxy, an examination of the difference between the correlation on long-term debt and short-term debt as proxies will be conducted later in the empirical analysis.

Independent variables

Size

The size of the firm is an important determinant factor of capital structure (Rajan & Zingales, 1995; Kumar et. al, 2017). Multiple studies show a positive correlation between the size of the firm and its leverage (Michaelas et. al, 1999; Kumar et. al, 2017). These studies reason that larger firms are more diverse and therefore have a lower risk. Consequently, lower risk enables larger firms to have easier access to capital markets including higher credit ratings for their

debt issue. This results in lower interest rates for their loans. Another rationale for this correlation is made by Warner (1977), showing that the ratio of the bankruptcy costs to the value of the firm decreases as the firm increases in size. The result from these studies is supported by the trade-off theory since larger firms have more benefits from debt compared to smaller firms. Due to this, the trade-off theory suggests a positive correlation between size and leverage.

However, one could argue that the size of the firm acts as an inverse proxy for information asymmetry since a more extensive amount of data and accurate information is available for larger companies. These companies often have a track record of growth that reduces information asymmetry since it offers more insight into their ability to repay financiers. This is described as a reason why larger firms have better access to the capital markets. Frank and Goyal, (2009) argue that lower information asymmetry enables larger firms to issue equity with better conditions. Vice versa, the incentive for smaller firms with a more prominent information asymmetry to external investors is to use debt rather than equity (Rajan & Zingales 1995). Thus, the pecking order theory suggests a negative correlation between size and leverage. The following hypotheses are constructed:

H1: Size is positively correlated with total debt to assets (Trade-off Theory)
H2: Size is negatively correlated with total debt to assets (Pecking Order Theory)

Various measurements can estimate size, such as the level of total assets or sales (Ferri & Jones, 1979; Rajan & Zingales, 1995). However, since FinTech firms typically have large intangible assets which are difficult to value, the book value of assets is a misleading measurement of size. Because of this, we have opted to use sales as a measurement of size. Furthermore, in line with Titman & Wessels (1988), we acknowledge that the effects of having absolute numbers can be challenging in the regression due to the big fluctuations. Therefore, this paper will use the natural logarithm of sales as a proxy for size. This is further used in the central studies (Frank & Goyal, 2009; Titman & Wessels, 1988). Rajan & Zingales (1995) also show in their meta-analysis that this is the most common and appropriate approach to measuring determinant factors of capital structure.

Liquidity

Liquidity refers to a firm's debt capacity and the ability to convert assets to cash in order to repay liabilities. Several studies have shown that liquidity affects the capital structure, with various implications (Kedzior et al. 2020). For example, high liquidity does not only mean having the potential to pay back the debt but also suggests that the firm has a low risk of insolvency. This lower bankruptcy cost indicates that the firm can acquire debt at a lower cost (Morellec, 2001). This argumentation is in line with the trade-off theory, suggesting a positive correlation between liquidity and leverage.

In contrast, the pecking order theory suggests that firms with high liquidity should borrow less. This is explained by the increasing agency costs as a result of managers who can make suboptimal investment choices with excess liquidity in order to maximize the value of the shareholders rather than the debt holders (Deesomsak et al. 2004). Furthermore, another explanation is that highly liquid firms can use their assets as an internal source of funding rather than seeking debt, which is in line with the pecking order. This leads to lower leverage (Oztekin & Flannery, 2012).

H3: Liquidity is positively correlated with total debt to assets (Trade-off Theory)
H4: Liquidity is negatively correlated with total debt to assets (Pecking Order Theory)

The proxy used to measure liquidity is the current assets divided by current liabilities. Several empirical studies have used this measure (Khan, 2012; Ghasemi & Razak, 2016). This measure is also compatible with the data available on the sample size.

Profitability

Profitability is commonly studied when examining determinants of capital structure with various results. Studies have shown that profitable firms have less leverage since these firms can finance operations through internal funding, thus reducing the need for any debt (Titman & Wessels, 1998; Rajan & Zingales, 1995; Michaelas et. al, 1999). According to the pecking-order theory, these firms would rather use internal funding than external funding due to informational asymmetry increasing the cost of debt. Hence, the prediction that profitability has a negative correlation with leverage is supported by the pecking order theory.

On the other hand, this is inconsistent with the trade-off theory since firms can take on debt to increase their debt tax shield. This gain is argued to be bigger for more profitable firms due to the potential of bigger tax offsets. This indicates that there is a positive correlation between profitability and leverage, which has been shown in the studies conducted (Panno, 2003; Zhang, 2010).

H5: Profitability is positively correlated with total debt to assets (Trade-off Theory)
H6: Profitability is negatively correlated with total debt to assets (Pecking Order Theory)

There are several ways to measure profitability, such as financial ratios based on operating income or EBITDA (Titman & Wessels, 1988, Rajan & Zingales, 1995). We have opted towards using the EBIT margin, also known as operating margin, which is EBIT divided by sales. Authors studying several industries simultaneously usually avoid EBIT in the proxy since it can be deceptive due to the fluctuations between the industries. However, this will not be an issue in this study. This proxy is reasonable to use since EBIT is calculated before income tax expenses and interest expenses are deducted. Thus, the proxy can analyze the performance of the firm without the cost of capital structure and tax expenses impacting the measurement.

Intangibility

Most of the studies done on the asset structure is addressing tangible assets due to their potential to be treated as collateral when taking on debt (Kedzior et al. 2020). However, since many FinTech firms' assets are intangible, it is more appropriate to investigate the ratio of intangible assets in relation to the capital structure. One major study on intangible assets and capital structure is made by Lim et al. (2020) who argue that intangible assets work in the same way as tangible assets, forming a positive correlation between the ratio of intangible assets and leverage. Lim et al. (2020) further argue that the intangible assets will produce future cash flows, whereupon these future cash flows can be used as safety when issuing debt, resulting in easier access to the capital market.

However, according to Hall (2010) who studied the capital structure of innovative firms, intangible assets are difficult to value which increases the risk. Furthermore, many intangible assets are internally generated, making the valuation of these even harder for external parties (Lim et al. 2020). Hence, Myers (2001) argues that according to the trade-off theory, having an asset structure with a higher ratio of intangible assets incentive the firms to avoid debt as they cannot provide safety to the debt holders in the same way a firm with a higher ratio of tangible assets can. Therefore, Myers (2001) states that there is a negative correlation between the ratio of intangible assets to total assets and leverage.

In contrast to this view, the pecking order theory suggests that the information asymmetry that arises with intangible assets, which is the case according to Hall (2010), implies that the firm will rather issue its funding with debt than equity. This is due to it being less sensitive to informational asymmetry (Myers & Majluf, 1984). Accordingly, the pecking order theory suggests that there is a positive correlation between intangible assets and leverage.

H7: Intangible assets are negatively correlated with total debt to assets (Trade-off Theory)
H8: Intangible assets are positively correlated with total debt to assets (Pecking Order Theory)

We examine asset structure by measuring the total intangible assets divided by the number of total assets as reported by our sample size. This measure is used by several papers (Titman & Wessels, 1988; Myers, 2001; Frank & Goyal, 2009; Kedzior et al. 2020; Lim et al. 2020).

Age

Another important determinant of capital structure is a firm's age. Some authors argue that older firms are more able to use internally generated funds to finance their investments (Burgstaller & Wagner, 2015) Since firms prefer internal funding rather than external according to the pecking-order theory, older firms would have less incentive to acquire external funding. Thus, the pecking order theory suggests a negative correlation between age and leverage. This view is supported by findings of other studies (Michaelas et al. 1999; Hall, 2004).

However, as noted by Myers (1984), the informational asymmetry between a firm's lenders and owners decreases the older the firm is, as the firm proves its track record. The older a firm is, the more reputable it becomes (Frank & Goyal, 2009). This allows for easier financing by debt and amounts to more benefits of debt according to the trade-off theory. Therefore, the trade-off theory suggests a positive correlation between age and leverage. Past empirical findings have found this correlation aligned with the trade-off model (Wald, 1999; Psillaki & Daskalakis, 2008).

H9: Age is positively correlated with total debt to assets (Trade-off Theory)
H10: Age is negatively correlated with total debt to assets (Pecking Order Theory)

Age has been previously measured as the time from the creation of the company to today, or from the time of the IPO of the company to today (Kieschnick & Moussawi 2018). Since most of our sample size is non-public, as well as taking into consideration the available data, we have decided to measure age as the time since registration of the business. There are not many other substitutes besides this proxy, and it is thus used in most studies.

Non-Debt Tax Shield

According to Modigliani & Miller (1958), if the interest payments on debt are tax-deductible, the firms with the most positive taxable income have large incentives to issue debt. This is the main argument for borrowing as it takes advantage of interest tax shields. On the other hand, the non-debt tax shield (NDTS) works as a substitute for tax benefits by debt financing since NDTS is the tax deduction effect of depreciation (Titman & Wessels, 1988). Titman & Wessels (1988) therefore argue that NDTS has a negative correlation with leverage since a higher NDTS will lower the potential tax benefit of debt, which is aligned with the trade-off theory. This view is emphasized by several studies (DeAngelo & Masulis, 1980; Deesomsak et al. 2004).

However, other studies have shown the opposite result according to the pecking order theory. Bradley et al. (1984) argued that firms with higher NDTS also imply a higher amount of tangible assets. Thereupon, these tangible assets can issue secured debt due as a result of less information asymmetry. Thus, firms with high NDTS should have more incentives to issue debt. Therefore, the pecking-order theory suggests a positive correlation between NDTS and leverage.

H11: Non-debt tax shield is negatively correlated with total debt to assets (Trade-off Theory)
H12: Non-debt tax shield is positively correlated with total debt to assets (Pecking Order Theory)

Different indicators of non-debt tax shields have been used in the relevant literature. These include depreciation over total assets and investment tax credits over total assets (Titman and Wessels, 1988). Since Sweden does not employ corporate tax credits, we have opted to use depreciation over total assets. This measurement is commonly used in the studies in the area (Hang, 2017; Titman & Wessels, 1988).

Growth

Several researchers argue that the trade-off theory predicts a negative correlation between growth and leverage (Titman & Wessels, 1988; Rajan & Zingales, 1995). This is because firms with high growth have increased flexibility in choosing projects. Consequently, increased flexibility also increases the opportunity to invest suboptimally to maximize the wealth for the equity owners. This leads to increased agency costs, whereupon a negative relationship between growth and leverage is assumed (Titman & Wessels, 1988; Rajan & Zingales, 1995; Frank & Goyal, 2008) Hence, this is aligned with the trade-off theory.

Contrarily, the pecking order theory suggests a positive correlation between growth and the debt to asset ratio (Michaelas et al, 1999; Frank & Goyal, 2008; Hang, 2017). They argue that firms that have more investments, holding profitability constant, will need more debt to finance these investments. Consequently, this results in increased leverage. In the light of the pecking order theory, firms with high growth tend to first try to finance their projects with internal funding. It is only after internal debt is used that they look for external funding, and when they do so, they prefer debt. This is the case when there are a lot of investment opportunities according to Kedzior et al. (2020).

H13: Growth is negatively correlated with total debt to assets (Trade-off Theory)
H14: Growth is positively correlated with total debt to assets (Pecking Order Theory)

Common measurements for growth are the market value of assets compared to the book value of assets (Frank & Goyal, 2009; Myers, 1977). Since FinTech is a relatively new industry, only ten companies in our sample size are listed on a public exchange, and we can therefore not use the market value to predict future growth. Looking at other ways to measure growth opportunities, we have considered looking at capital expenditures over total assets and R&D over total assets as suggested by Titman & Wessels (1988). However, very few of our sample size report notable R&D costs or capital expenditure numbers. We have opted to use historical growth in revenue as a proxy for growth. This measurement is compatible with the reporting of the companies in our sample size (Wald, 1999). It is important to note that authors differentiate past growth from future growth opportunities (Michaelas et. al, 1999). Our proxy measures growth in the past tense.

Risk

Risk is one very important dimension to consider when studying the determinants of capital structure. Higher risk implies increased volatility in earnings, which should translate into higher expected costs of bankruptcy and according to the trade-off theory reduce the leverage that companies take on (Myers, 1984). This is because the increased cost of financial distress will decrease firms' access to capital markets, thus, they will use less debt. This view is supported by several authors who argue that risk-taking companies tend to issue equity rather than debt in need of financing (Panno, 2003; Frank & Goyal, 2009). Thus, the trade-off theory suggests a negative correlation between risk and leverage.

In contrast to this, Jordan et al. (1998) found that the correlation between risk and the debt to asset ratio is positive. This is in line with the pecking order theory since firms with higher risk imply the existence of higher information asymmetry (Myers & Majluf, 1984, Frank & Goyal, 2009; Hang, 2017). Information asymmetry affects the ability to raise equity more than the debt due to the priority of payments to financiers where debt holders receive money before equity holders. Thus, Myers & Majluf (1984) argue that these types of firms have relatively more leverage.

H15: Risk is negatively correlated with total debt to assets (Trade-off Theory)
H16: Risk is positively correlated with total debt to assets (Pecking Order Theory)

We use the standard deviation of change in EBIT as a proxy for risk which is commonly used in other studies (Kumar et al. 2017). Risk is known to vary across industry and sector, although this variation is excluded by only examining firms in the FinTech sphere.

Major City

Several studies have documented a negative correlation between being located in a major city and the debt to asset ratio (Wang et al. 2016). The pecking order theory states that the reason why firms prefer debt over equity is that debt is less sensitive to informational asymmetry. Proximity to financiers and the public reduces the informational asymmetry of firms in cities compared to firms located remotely. Therefore, according to the pecking order theory, being located in major cities predicts a negative correlation with leverage.

In contrast to this, there are studies showing a positive correlation between firms located in major cities and the debt to asset ratio (Alnori & Jerbeen, 2020). The trade-off theory suggests that firms' leverage is dependent on the costs and benefits produced by issuing debt and equity. Firms in bigger cities decrease the information asymmetry to banks as well as investors since these firms usually are closer to their financiers. (Wang et al. 2016). As trade-off theory suggests, this will decrease the indirect bankruptcy costs which will be displayed in lower interest rates. This improves the conditions on the loan and increases the incentives to take on debt. Therefore, according to the trade-off theory, being located in major cities has a positive correlation with leverage.

H17: Located in major cities is positively correlated with total debt to assets (Trade-off theory)
H18: Located in major cities is negatively correlated with total debt to assets (Pecking order theory)

The proxy that will be used for this is a dummy variable called Major City. This variable will be 1 if the firm is located in Stockholms län, Västra Götalands län or Skåne län, and 0 if not. These counties cover the three major cities in Sweden, namely Stockholm, Gothenburg, and Malmö.

To conclude, these variables cover the common factors that are mentioned in the major studies on the subject (Kumar et al. 2017). There have been studies that support both the pecking-order theory as well as the trade-off theory, which proves that macroeconomic factors such as the industry or the country affect the determinants of capital structure. The determinant factors are summarized in Table I below along with the hypotheses, theories, and proxies.

Table I

Summary of Variables and Theoretical Hypotheses

The table reports our regression model's dependent and independent variables. The type of variable is reported which is three dependent variables (total debt leverage, long-term debt leverage, and short-term debt leverage) and nine independent variables (size, liquidity, profitability, asset structure, age, non-debt tax shield, growth, risk, and major city). The shortenings are presented in parentheses. The hypotheses are reported where a predicted positive correlation is denoted as a positive sign and a predicted negative correlation is denoted as a negative sign. There is no hypothesis that predicts the dependent variable, thus is denoted as not available (n/a). The hypotheses are presented under its associated theory, the trade-off theory or the pecking order theory. Furthermore, the proxy is presented for each of the factors.

Determinant factor	Variable	Trade-off theory	Pecking order theory	Proxy
Total Debt Leverage (TDL)	Dependent	n/a	n/a	Total Debt/Total Asset
Long-term Debt Leverage (LDL)	Dependent	n/a	n/a	Long-term Debt/Total Assets
Short-term Debt Leverage (SDL)	Dependent	n/a	n/a	Short-term Debt/ Total Assets
Size (SIZE)	Independent	+ (H1)	- (H2)	Ln(Sales)
Liquidity (LIQ)	Independent	+ (H3)	- (H4)	Current Assets/Current Liabilities
Profitability (PROF)	Independent	+ (H5)	- (H6)	EBIT/Sales
Intangibility (INTANG)	Independent	- (H7)	+ (H8)	Intangible Assets/Total Assets
Age (AGE)	Independent	+ (H9)	- (H10)	Years since registration
Non-Debt Tax Shield (NDTS)	Independent	- (H11)	+ (H12)	Depreciation/Total Assets
Growth (GROWTH)	Independent	- (H13)	+ (H14)	Annual Growth in Sales
Risk (RISK)	Independent	- (H15)	+ (H16)	Standard deviation of change in EBIT
Major City (MAJOR)	Independent	+ (H17)	- (H18)	County code

Section III - Data and Empirical Methodology

In this section, the data and empirical methodology will be presented. First, the section starts with a description of the process of gathering and structuring the raw data for the sample. Secondly, the empirical methodology will be made clear including the presentation of our regression models and software program. Thirdly, a description of the robustness check will be made, including the process of winsorizing and a multicollinearity test that is presented in Table II.

III.I Sample Selection

The selection of firms for this study was sourced from Tillväxtanalys. We chose this source since it is the only source that gives insight into Swedish FinTech firms. From Tillväxtanalys we obtained a list of all the established FinTech firms in Sweden from the author of a paper on FinTech firms published in 2020. Initially, the total number of firms gathered was 367. To authenticate this information, the data was cross-checked with the companies' business descriptions, offerings, and solutions through their web pages in order to verify that they are within the definition of a FinTech firm. That is *technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions, and the provision of financial services.* (Tillväxtanalys, 2020).

Thereafter, the data for the firms were sourced from the database Retriever Business. This is the most appropriate database for this study since it provides the required raw data that we have used to create proxies for our variables. The raw data gathered from the database is based on company annual reports and consists of the following data points; *Total Assets, Sum of current liabilities, Sum of long-term liabilities, Sum of Equity, Sales, EBIT, Depreciation, Sum of intangible assets, Current Assets, Date of registration, and County Code.*

We chose to measure the variables from 2018 to 2020. This mix of cross-sectional data and time-series data is called panel data. First, this is a common practice as using data from several years is implemented in order to reduce certain measurement errors that can occur due to random year-to-year fluctuations in the variables. (Titman and Wessels, 1988) By using panel data, the reliability of the study increases as a result of more observations when including several years. Secondly, data for a series of times is necessary to examine growth measurements as well as the fluctuations to calculate the risk.

The data was exported from Retriever Business into Excel to construct the proxies for the variables. Thereupon, the data was subject to a shortfall since Retriever Business did not have 14 of the firms in their database, thus, only 353 firms were subject to observation.

Not every company had data for every year of the three-year period that we examined. We removed the firm that did not have data for our proxies during all three years to omit bias. This left the dataset of 208 firms. The data was exported to SPSS for the various tests.

III.II Empirical Methodology

Among the quantitative studies regarding determinants of capital structure, the most common choice of method is using regression models when dealing with panel data, whereupon Ordinary Least Squares regression (OLS) is the most frequently used one (Studenmund, 2011). OLS regression estimates the coefficients of the linear regression equation which describes the

relationship between one or more independent quantitative variables and a dependent variable. Although there are several different estimation techniques, Studenmund (2011) argues that OLS is user-friendly, appropriate from a theoretical standpoint, and has useful characteristics.

Furthermore, it is important to use the appropriate software program to execute the regressions. SPSS was selected over R, Stata, and SAS for many reasons. First of all, SPSS has the capabilities to execute OLS regression and robustness tests (Park, 2009; Ward, 2013). When comparing the software programs in aspects important for our study and presentation of results, SPSS is advantageous in the analytical procedure, its ease of data entry and display when it comes to graphs and tables (Ward, 2013). Lastly, due to our personal preferences and practical experience of working with SPSS in earlier projects, this software program was settled upon. In order to examine the correlation between the dependent variable and the independent variables, the multiple linear regression models have been constructed as follows:

$$TDL_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 PROF_{it} + \beta_3 NDTS_{it} + \beta_4 INTANG_{it} + \beta_5 LIQ_{it} + \beta_6 AGE_{it} + \beta_7 GROWTH_{it} + \beta_8 RISK_{it} + \beta_9 SMAJORy_{it} + \varepsilon_i$$

$$LDL_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 PROF_{it} + \beta_3 NDTS_{it} + \beta_4 INTANG_{it} + \beta_5 LIQ_{it} + \beta_6 AGE_{it} + \beta_7 GROWTH_{it} + \beta_8 RISK_{it} + \beta_9 SMAJORy_{it} + \varepsilon_i$$

$$SDL_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 PROF_{it} + \beta_3 NDTS_{it} + \beta_4 INTANG_{it} + \beta_5 LIQ_{it} + \beta_6 AGE_{it} + \beta_7 GROWTH_{it} + \beta_8 RISK_{it} + \beta_9 SMAJORy_{it} + \varepsilon_i$$

where;

TDL_{it} = Total Debt/Total Assets for firm i at year t
LDL_{it} = Long-term Debt/Total Assets for firm i at year t
SDL_{it} = Short-term Debt/Total Assets for firm i at year t
SIZE = Ln(Sales) for firm i at year t
PROF = EBIT/Sales for firm i at year t
$NDTS_{it}$ = Depreciation/Total Assets for firm i at year t
$INTANG_{it}$ = Intangible Assets/Total Assets for firm i at year t
LIQ_{it} = Current Assets/Current Liabilities for firm i at year t
AGE_{it} = Years since registration for firm i at year t
$GROWTH_{it}$ = Annual growth in Sales for firm i at year t
$RISK_{it}$ = Standard Deviation of change in EBIT for firm i at year t
$MAJOR_{it}$ = 1, if the firm is located in Stockholms län, Västra Götalands län, or Skånes län, and 0 if the firm is located in other counties than these for firm i at year t
ε_{it} = Error term for firm i at year t

III.III Check for Robustness

Extereme Observations

For the data to be reliable and as generalized as possible, it is important to identify outliers (Studenmund, 2011). This is especially important in an OLS regression since it is sensitive to extreme observations (Shalit & Yitzhaki, 2002). Therefore, box diagrams were constructed to

identify the distribution and eventual outliers which are presented in Figure 1. The dummy variables measuring county code were not a subject for this since the dummy variable is binary. It can be observed that the number of outliers, as well as its degree of extremeness, varies.

Studenmund (2011) argues to look for data that is unrealistic or impossible. For example, since we are looking at growth in revenue in terms of percentage, and several of our sample companies start off with very low revenue, there are bound to be some extreme outliers. To demonstrate, one newly started company had a yearly growth of 1500%. However, this example is occasional and does not represent the population. Therefore, actions had to be made for the study to be as generalized as possible.

For the data to represent the population, Charles P. Winsor argued (1941) that outliers should not be rejected, but instead be adjusted to a nearby value (Dixon, 1980). This common method is called winsorizing. Therefore, a cumulative percentage of the data within 2.5% on the end of each tail was adjusted to the closest number outside of this range. As a result, extreme outliers were adjusted to a more normal value reflecting a more representative value for the industry which can be seen in Figure 2. As a result, the range of observations was limited immensely, and outliers were reduced and centered.

Multicollinatery

Furthermore, Studenmund (2011) states that multicollinearity should be examined, which is present if the independent variables correlate with each other. This would make the intercept of the study less valid. The multicollinearity result is presented in Table V. If any correlation is above | 0.80 | between the independent variables, multicollinearity is present. Observing Table II, one can conclude the matter is non-existing. Due to there being no multicollinearity present, the regression has incorporated all independent variables simultaneously when executed.

Table II

Summary of Correlation Matrix

This table reports the summary of the correlation matrix. It presents the pairwise correlations between all variables examined including both dependent and independent variables. The dependent variables are TDL (total debt divided by total assets), LTL (long-term debt divided by total assets), and SDL (short-term debt divided by total assets), whereas the independent variables are SIZE (logarithm of sales), LIQ (current assets divided by current liabilities), PROF (EBIT divided by sales), INTANG (intangible assets divided by total assets), AGE (time since registration of business), NDTS (depreciation divided by total assets), GROWTH (growth in revenues), RISK (standard deviation of change in EBIT) and MAJOR (valued 1 if being located in Stockholms län, Västra Götalands län or Skåne län and 0 if not). The sample consists of data from 208 firms from the period 2018 to 2020, totaling 624 observations for each variable. The data has been subject to winsorizing of 2.5 percent on each tail of the dataset. Significance levels: *($p < 0.05$), **($p < 0.01$).

Variable	TDL	LDL	SDL	SIZE	LIQ	PROF	NDTS	INTANG	GROWTH	AGE	MAJOR	RISK
TDL	--											
LDL	0.483**	--										
SDL	0.676**	-0.237**	--									
SIZE	0.201**	-0.011	0.231**	--								
LIQ	-0.358**	0.101*	-0.491**	-0.157**	--							
PROF	0.193**	0.099*	0.150**	0.492**	-0.115**	--						
NDTS	0.212**	0.195**	0.080*	-0.108**	-0.235**	0.010	--					
INTANG	0.071	0.234**	-0.114**	-0.171**	-0.233**	0.038	0.604**	--				
GROWTH	0.101*	-0.037	0.127**	0.195**	-0.040	-0.004	0.012	0.011	--			
AGE	0.043	-0.053	0.128**	0.404**	-0.053	0.184**	-0.080*	-0.217**	0.069	--		
MAJOR	0.088*	0.022	0.057	-0.028	-0.047	-0.056	0.089*	0.124**	0.009	0.092*	--	
RISK	0.084*	0.015	0.072	0.175**	-0.023	0.056	-0.060	-0.086*	0.374**	0.014	-0.030	--

Section IV. Result

In this section, the empirical result will be presented. First, the descriptive statistics will be shown in Table III following an interpretation of the results. Secondly, the regression analysis will be presented in Table IV as well as the summary of hypotheses will be presented in Table V.

Table III

Summary of Descriptive Statistics

The table reports the descriptive statistics for our main data. The sample consists of data from 208 firms from the period 2018 to 2020 which totals 7,488 observations. The variables reported are TDL (total debt to assets), LDL (long-term debt to assets), SDL (short-term debt to assets), SIZE (logarithm of sales), LIQ (current assets divided by current liabilities), PROF (EBIT divided by sales), INTANG (intangible assets divided by total assets), AGE (time since registration of business), NDTS (depreciation divided by total assets), GROWTH (growth in revenues), RISK (standard deviation of change in EBIT) and MAJOR (valued 1 if being located in Stockholms län, Västra Götalands län or Skåne län and 0 if not). The data has been subject to winsorizing of 2.5 percent on each tail of the dataset. The table reports the minimum value (min), maximum value (max), average (mean), and standard deviation of the values.

Variable	Min	Max	Mean	Std.Dev.
TDL	0.060	0.990	0.495	0.288
LDL	0.000	0.770	0.116	0.202
SDL	0.040	0.950	0.395	0.262
SIZE	3.930	13.460	9.092	2.084
LIQ	0.110	23.330	3.063	4.421
PROF	-27.080	0.430	-2.027	5.296
INTANG	0.000	0.900	0.227	0.274
AGE	3.000	30.000	9.360	6.733
NDTS	0.000	0.350	0.057	0.086
GROWTH	-1.000	164.220	7.880	29.055
RISK	0.030	125.44	7.511	22.067
MAJOR	0.000	1.000	0.855	0.351
Number of observations	7,488			

Descriptive Statistics

Table III presented above reports the descriptive statistics of the data. Harris and Raviv (1990) argue that one of the limitations of comparing studies conducted on determinants of capital structure is due to the different firm characteristics, proxies used, time periods, and methodologies. Since there are limited studies on Swedish firms during this period using the same proxies, we chose not to compare these descriptive statistics to other studies. However, the table still explains the results of the study as well as gives an understanding of how the Swedish FinTech industry behaves.

The average total debt to total asset ratio of the firms is 0.495 which means that the average firm in our sample is financed by 49.5% debt and 50.5% equity. One can observe that approximately 12% of these are long-term debt and 40% are short-term debt. The small difference between total debt and the sum of long-term debt and short-term debt is a result of winsorizing effect having a different impact on different variables. The average sales of the firms we have investigated are approximately 9 million crowns after translating the proxy. The average liquidity is 3.063, which indicates these firms on average have the financials to stay solvent in the short term. The average profitability in terms of EBIT/revenue is -2.072 which means that the average FinTech firm has annual losses of twice their revenue. Regarding asset structure, the average firm has 22.7% of its assets as intangible. Firms in our sample size are on average 9.36 years old. The non-debt tax shields of our sample size are, on average, 0.057, according to our proxy. This means that the average FinTech firm has a depreciation on their total assets of 5.7% per year. The average annual growth in revenues among the firms is 780%. The average risk of the firms is 7.511 which means that the standard deviation in the change in EBIT is more than 700% because of the immense fluctuations. 85.5% of the firms are located in counties with major cities.

Regression Analysis

The summary of the regression analysis and hypotheses is presented in Table IV. What can be concluded is that seven out of nine variables had a significant value, thus seven hypotheses could be accepted. Four out of seven of these hypotheses could be associated with the trade-off theory whereas three could be associated with the pecking-order theory. The coefficient in Table IV signifies how much the dependent variable changes when shifting the independent variable with one unit holding the other variables constant. Comparing the results is difficult since the proxies have different numerical value scales such as percentages, logarithms, years, and a binary dummy variable.

Furthermore, the R-Squared value is 0.203 for total debt to total assets, 0.102 for long-term debt to total assets, and 0.340 for short-term debt to total assets. This means that the regression model that explains the most is the one using short-term debt as a proxy for leverage. However, in the light of other studies in this area, common values can range from 0.05 to above 0.30 (Rajan & Zingales, 1995). Thus, all three models have explanatory value. Although the set of variables is commonly used in most studies, it is notable that R-Squared values are still far from 1 implying that there are many explanatory variables not included in this study (Rajan & Zingales, 1995; Hang, 2017).

The results of all three regression models are reported in Table IV. Regression (1) using total debt to total assets conducts six out of nine independent variables as significant. These are size, liquidity, profitability, intangibility, non-debt tax shield, and being located in a major city.

Regression (3) using short-term debt to total assets conducts the same independent variables as significant as regression (1), whereupon it additionally shows a significant value on growth as well. The similarity between the regression model (1) and (3) can be explained since FinTech firms are mainly using short-term debt, approximately 80% of their total debt according to Table III.

Meanwhile, examining the empirical outcome for regression (2) using long-term debt to total assets as a proxy, there are differences in the results. This regression does not conclude any significant results regarding growth or major city, whereas it has other signs on the correlations of liquidity and intangibility.

Table IV

Summary of Regression Analysis

The table reports the regression analysis. The sample consists of data from 208 firms from the period 2018 to 2020 which totals 6,240 observations for each regression. The data has been subject to winsorizing of 2.5 percent on each tail of the dataset. The regressions as a whole use three dependent variables, TDL (total debt to assets), LDL (long-term debt to assets), and SDL (short-term debt to assets), whereupon nine independent variables are used including SIZE (logarithm of sales), LIQ (current assets divided by current liabilities), PROF (EBIT divided by sales), INTANG (intangible assets divided by total assets), AGE (time since registration of business), NDTS (depreciation divided by total assets), GROWTH (growth in revenues), RISK (standard deviation of change in EBIT) and MAJOR (valued 1 if being located in Stockholms län, Västra Götalands län or Skåne län and 0 if not). The table reports the significance level and the standard errors which are presented in parentheses. The three different regressions are divided into three columns. Regression (1) uses TDL (total debt to total assets) as a proxy, regression (2) uses LDL (long-term debt to total assets) as a proxy whereas regression (3) uses SDL (short-term debt to total assets) as a proxy. Significance levels: *($p < 0.05$), **($p < 0.01$), ***($p < 0.001$).

Variable	TDL (1)	LDL (2)	SDL (3)
Constant	0.398*** (0.068)	0.023 (0.050)	0.427*** (0.056)
SIZE	0.013* (0.006)	0.003 (0.005)	0.007* (0.005)
LIQ	-0.020*** (0.002)	0.009*** (0.002)	-0.030*** (0.002)
PROF	0.007** (0.002)	0.004* (0.002)	0.004* (0.002)
INTANG	-0.148** (0.050)	0.156*** (0.037)	-0.317*** (0.041)
AGE	-0.002 (0.002)	0.000 (0.001)	0.000 (0.001)
NDTS	0.747*** (0.153)	0.276* (0.114)	0.484*** (0.127)
GROWTH	0.001 (0.000)	0.000 (0.000)	0.001** (0.000)
RISK	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
MAJOR	0.064* (0.030)	0.001 (0.022)	0.049* (0.025)
Observations	6,240	6,240	6,240
R-Squared	0.203	0.105	0.340

Section V. Empirical Analysis

In this section, an analysis of the empirical outcome will be conducted. The variables will be analyzed in the following order: size, profitability, liquidity, intangibility, age, non-debt tax shield, growth, risk, and major city.

Size

Size (logarithm of sales) has a significant positive correlation with total debt to assets and short-term debt to assets. This result is aligned with the trade-off theory since smaller firms have a higher agency cost associated with the informational asymmetry between the management and debtor compared to larger firms. Larger firms with less informational asymmetry are therefore more likely to increase debt than equity due to receiving more favorable terms (Michaelas et al. 1999; Kedzior et al. 2020).

Another reason behind the result is that size can be seen as an inverse proxy for the probability of default (Rajan & Zingales, 1995). That is, larger firms signal a lower risk of default due to a successful track record. Since the FinTech industry is an inherently risky industry, with many small start-ups having large-scale effects, it is reasonable that larger firms are perceived as more established in the market (Berggren et al. 2000). Thus, larger firms will be viewed more favorably by external financiers due to the decreased risk.

Furthermore, the result is supported by the papers of Tillväxtanalys (2020) and the Swedish FinTech Association (2021), showing the larger firms are the ones raising the most funding. Moreover, as previously mentioned, smaller firms are subject to the increased threat of having their business account closed at one of the major banks. At the same time, this risk is seen as insignificant for larger firms, thus resulting in easier access to the capital market (Tillväxtanalys, 2020; Swedish FinTech Association; 2021). Moreover, the transaction costs for loans and bankruptcy costs are usually lower for larger companies. (Kedzior et al. 2020). All the above factors imply that attracting debt is more advantageous for larger firms.

On the other hand, the pecking order theory would suggest that larger firms will have easier access to raising equity relative to smaller firms due to the decrease in informational asymmetry that impacts equity investors disproportionately more than debt investors. However, size does not seem to influence the incentives for acquiring equity in the FinTech industry. In a high-scale industry, there might be more important factors instead of sales to consider when acquiring shares in a firm, such as the type of technology, scale-up possibility, revenue model, or management. On the other hand, a company with a larger sales record is enough to convince banks that the company has enough cash inflow to pay back the debt, giving more favorable terms for raising debt.

Size is positively correlated with short-term debt to assets, long-term debt to assets, and total debt to assets. However, long-term debt to assets has no significant value, thus no interpretation of the differences between the proxies can be reliably made.

Profitability

Profitability (EBIT divided by sales) has a positive significant correlation between long-term debt, short-term debt, and total debt to assets. The correlation is aligned with the trade-off theory. This is because profitable companies have easier access to the capital market due to having a proven record of internally generated funds, thus, can finance their activity through debt with better conditions (Kedzior et al. 2020). This might be reasonable in this industry

because the average industry profitability is negative. Any company that manages to generate a profit signals that they are in a state where they are likely able to repay future interest payments. (Lim et al. 2020; Hall, 2010). Being profitable in this industry is therefore likely seen as unique and is likely to improve the terms that banks offer on their loans, incentivizing taking on debt.

Another reason supporting the result could be that firms that are profitable want to take on debt to decrease their tax paid. Sweden applies a fixed level of a tax rate of 20.6%, thus the incentive should increase since the amount of absolute tax paid is bigger for more profitable firms holding everything else constant.

On the other hand, the pecking order theory argues that more profitable firms can generate their own internal cash flows, and thus, are not in need of the ability to fund themselves externally. This ensures that they do not have to be subject to the agency costs that follow. However, in this industry, it might be the case that even though the firm is profitable, the need of investing heavily into its disruptive technologies requires more capital than its internally generated funds can provide. This is especially true in this industry where the average firm is small and needs to finance a high-tech scalable solution.

Liquidity

Liquidity (current assets divided by current liabilities) has a negative correlation with total debt to assets and short-term debt to assets. This is aligned with the pecking order theory and what most studies conclude (Kumar et al. 2017). Higher liquid firms are likely to be able to generate cash flows within their internal operations, and thus will use these generated funds primarily to finance the firm since they have the least informational asymmetry associated with them (Kedzior el al. 2020). This is especially true in the FinTech industry due to high uncertainty and noticeable informational asymmetry. Hence, firms with high liquidity have a lower incentive to take on debt, and thus have lower leverage.

In contrast to this correlation, the trade-off theory suggests that there would be a positive correlation between liquidity and leverage. This is because higher liquidity can be seen as a proxy for decreasing the risk of insolvency which means that it can acquire debt at a lower cost (Morellec, 2001). However, since the risk is a major consideration in the FinTech industry it could be the case that even though the firm is more liquid, it has a small impact on the perception of risk and will not affect the access to the capital market in the same sense as for other industries.

On the other hand, long-term debt to assets has a positive correlation with liquidity. Thus, there seems to be the case that the signaling of decreasing risk of insolvency through increased liquidity incentives the firms to acquire long-term debt rather than short-term debt. This is because firms are able to receive better long-debt terms from lenders given that they are less likely to default in the near time.

NDTS

Non-debt tax shields (depreciation divided by total assets) are observed to have a significant positive correlation with long-term debt to assets, short-term debt to assets, and total debt to assets. Thus, there are no differences in the relationships between the proxies. The positive correlation is aligned with the pecking order theory and is supported by studies with similar findings (Bradley et al. 1984). This is because firms investing into tangible assets can use these

assets as collateral for secured debt which improves access to the capital market (Bradley et al. 1984). Having more tangible assets rather than intangible assets makes it easier to access the capital market due to the availability of collateral and accurate valuation. For example, this can be equipment or buildings rather than software, patents, copyrights, or licenses. This can be highly effective in the FinTech industry since it is risky and uncertain, whereupon having secured debt reduces the risk-taking of the banks. The positive correlation between NDTS and leverage is aligned with previous research findings. (Rajan & Zingales, 1995)

The argument for a negative correlation is that NDTS works as a substitute for the tax benefits of debt financing (DeAngelo & Masulis, 1980). One can see that FinTech firms are not subject to taxation since the majority of the firms are having a negative EBIT since the average profitability in the industry is negative. Therefore, the result can be seen as reasonable for the FinTech industry.

Age

Age (time since registration of the business) has a negative correlation with total debt to assets. This is aligned with the pecking order theory. This is because a firm that is more mature has a greater possibility to generate internal funding, thus reducing the need for external funding (Michaelas et al. 1999). Another explanation could be that older firms have had a longer time to establish relationships with equity owners and increase their access to equity due to their relations.

Since firm age implies a better track record, the trade-off theory suggests that these firms should have greater opportunities for debt financing. However, this rationale might not be the case in the FinTech industry since age does not necessarily correlate with a track record that would indicate that they could pay back their debt. Instead, factors like sales or profitability could have a more prominent influence which is further supported by our result.

However, the lack of significant value can't support any hypothesis. The reason behind this can be that other factors are valuable for getting access to the capital market. Furthermore, long-term debt and short-term debt show no correlation with age and no significance. Thus, this study cannot conclude that age is a determinant factor of capital structure.

Intangibility

Intangibility (total intangible assets divided by total assets) has a negative correlation with total debt to assets and short-term debt to assets. This follows the trade-off theory. Debtors have more interest in giving beneficial loans if the firm has tangible assets rather than intangible assets since intangible assets are hard to use for collateralization and have high valuation risk. (Hall 2010; Kedzior et al. 2020; Lim et al. 2020). Hall (2010) argues that debt financing is poorly suited to finance firms that are intensively investing in intangible assets which is the case in FinTech. This stems from intangible assets increasing informational asymmetry. This implies that intangible assets have a negative correlation to leverage within the industry. Therefore, the FinTech firms that have relatively more intangible assets than others, relying more on high-tech investments or expenditure on innovation leading, will be more discouraged to take a loan (Lee and Brown, 2017).

On the other hand, Hall (2010) states that firms within certain industries can have patents that are moderately easy to value and can work as collateral. However, in a high scale-up and uncertain industry with disruptive technologies, it is uncertain how easily patents are

valued by Swedish banks and how this affects the condition for issuing debt. According to our results, it seems not to have any effect on short-term debt.

On the contrary, long-term debt has a positive correlation with intangibility. An explanation for this is that intangible assets such as brands or patents often take a long time to realize in terms of earnings. Therefore, a firm that has strong intangible assets are likely to generate cash flows for a long period forward, reducing the risk for long-term debt lenders and improving conditions for long-term debt. Since short-term debt needs to be repaid right away and intangible assets don't typically generate short-term cash flows, it is reasonable that the correlation is negative.

Risk

Risk (standard deviation of change in EBIT) has zero correlation with total debt to assets, long-term debt to assets, or short-term debt to assets. This is an interesting result since risk is one of the major important characteristics of a FinTech firm (Tillväxtanalys, 2020). This is contrary to the trade-off theory as well as the pecking order theory. However, the result is not significant, and we can therefore not with certainty draw any reliable conclusions.

The non-existent correlation is in line with the varying results of other studies on this matter since studies have shown both positive and negative correlations (Delicado Teixeira & Melo Parreira, 2015). Although this study uses the same formula for risk as major papers, the difference between the results can be results of different industry characteristics, proxies, or a different time span. However, with the data available, another proxy would not have been as reliable, and a wider timespan would decrease the number of companies in the sample size which would hurt the reliability of the study.

Growth

Growth (growth in revenue) has a positive correlation with total debt to assets. This is aligned with the pecking order theory. One explanation is that firms with higher growth will have a lot of different projects to finance, hence will use all their internal funds and have to take external funding in order to fund their growth. Thus high growth firms will have more incentives to finance themselves externally, using debt primarily rather than equity according to the pecking order theory.

Realizing growth opportunities is especially important in the FinTech industry because funding these initial developments is crucial in order to generate positive cash flows in the future. This is supported by Berggren et al. (2000) as high reinvestment rates in technology firms require them to seek external sources in order to finance their activities since they have already used all their own funds.

According to the trade-off theory, growth has a negative correlation with leverage. The argument here is that firms with high growth have flexibility in choosing projects, which increases the agency cost since management and financiers have different preferences regarding value maximization. This can result in suboptimal investments that benefit the management more than the firm itself (Titman & Wessels, 1988; Rajan & Zingales, 1995; Frank & Goyal, 2009). However, in the early stages of firm development, where growth is the highest, market, management, and equity holders are likely to have more aligned goals. This is because management often has equity in early-stage high-growth firms to incentivize firm

development. Furthermore, there is no excess cash generated by the business, which limits the suboptimal spending activities that management can pursue (Goldstein et al, 2019).

However, there is no significant value for total debt to assets, thus no conclusion regarding this proxy as a determinant of capital structure can be made. The same result is conducted regarding long-term debt. On the other hand, short-term debt has a significant positive result. The difference can be explained by the fact that long-term debt is harder to acquire when the firm is in the early stages of firm development where the growth is the highest and the firm is likely deemed as risky.

Major City

Major city (being located in Stockholms län, Västra Götalands län, or Skåne län) has a significant positive correlation with total debt to assets and short-term debt to assets. This is aligned with the trade-off theory. Being located in a major city reduces the informational asymmetry due to increasing proximity to banks and the public. Lower information asymmetry reduces indirect bankruptcy costs, and therefore, the conditions for loans are more favorable to actors located in major cities than otherwise (Alnori & Jerbeen (2020). This is supported by the fact that the firms have reported that physical meetings are a key component in establishing relationships with the bank and thus getting better conditions for debt. Since firms in major cities have easier access to physical meetings with banks being located closer and having more options, it supports the result (Tillväxtanalys, 2020).

Another explanation can be found in adverse selection. Since FinTech firms face high asymmetric information, and there is a big risk that they will fail, they often have a hard time raising equity. As firms get bigger, the informational asymmetry decreases. While this happens, the need for supporting infrastructure increases. It is therefore reasonable that the bigger FinTech firms that are able to issue debt are located in the cities. This is supported by the result since both size and being located in a major city have a positive correlation with leverage.

Furthermore, it is important to note that we used area codes for counties with the three biggest cities as proxies for those cities. Thus, there is no guarantee that all of the firms in these area codes are located in these cities, or that firms outside of these area codes are not basing their operations in large cities. With this noted, our independent variables showed significant values despite the imperfections of the proxies used. Lastly, it is apparent that there is no significance for long-term debt. Thus, no interpretation of the correlation with this proxy can be made.

Section VI. Discussion and Limitations

In this section, the empirical study and its results and limitations will be discussed. The discussion is based on the empirical results that are presented in Table IV as well as Table V in Appendix which summarizes the findings according to the hypotheses. The limitations are based on general considerations of our method and data.

Discussion

Total debt to assets has four significant correlations that are aligned with the trade-off theory, whereas two significant results are aligned with the pecking-order theory predictions. For the total debt to asset ratio, we see that the trade-off theory provides more explanatory value. Long-

term debt to assets has two significant correlations aligned with the trade-off theory predictions and two significant results aligned with the pecking order theory. Thus, for the long-term debt to asset ratio, both theories seem to provide equal explanatory value. The short-term debt to asset ratio has four significant results aligned with the trade-off theory while three of the significant results are aligned with the pecking order theory.

To conclude, the trade-off theory provides more explanatory value for the total debt to asset ratio and short-term debt to asset ratio compared to the pecking order theory in the Swedish FinTech industry. This means that firms are most firms are financing their operations by aiming for an optimal capital structure rather than using a specific order of financing source. What must be noted though is that the trade-off theory explains four out of seven significant results, thus the theory has only marginally more explanatory value than the pecking order theory. Meanwhile, for the long-term debt to asset ratio, no significant differences between the results of the predictions made by the different theories can be observed.

It is notable that the correlation coefficients for liquidity and intangibility were positive for long-term debt to assets while they were negative for short-term debt to assets. This indicates that there are differences between the incentives to acquire short-term debt and long-term debt depending on companies' liquidity and asset structure. Besides those two findings, there do not seem to be any significant differences between the correlations of long-term debt and short-term debt.

Lastly, this study is more descriptive in its nature. The empirical analysis should not be confused with a normative recommendation regarding how FinTech firms should act. This is highly dependent on company-specific factors. We simply aim to create an understanding of how the theoretical research foundations apply to this specific industry. Furthermore, there is not any clear predictive value in the study. For example, even though leverage has a positive correlation with profitability in the industry, increasing leverage does not per default increase profitability.

Limitations

The first limitation of this study is its dependency on the specific proxies established. This is the case for all studies within the area. Using different proxies would result in different empirical outcomes. Although the proxies were constructed with consideration and regard to the most commonly used measurements within the research area, this must be seen as a limitation. Furthermore, we did not have access to data points that could have improved our validity. For example, when looking at growth, we had to use historical growth in revenue as a proxy. For future studies, it might be interesting to study how estimated future growth impacts capital structure. For example, by looking at public companies and comparing the market value of assets with the book value of assets. This is something that we could not do since most of our sample had no public valuation.

One limitation of this study could be the time-variant effects of COVID-19 since the majority of FinTech firms report that they have been affected negatively during this period. (Swedish FinTech Association, 2021). Difficulties in this period include firms reporting a more challenging time acquiring capital (Swedish FinTech Association, 2021). Therefore, it is not certain that our results will maintain in another time period. Since many of the firms are young, it would not be possible to examine another period due to the significant reduction in the sample. Thus, extending the scope of the time frame would reduce the reliability of the study. Therefore, regressions for each individual year, 2018, 2019, and 2020, have been conducted to

examine if there are any major differences. Specifically, it is interesting to see if there are any significant differences in the year 2020 when the COVID-19 hit. What can be concluded from Table VI, Table VII, and Table VIII in appendix is that no remarkable change has been made in the regression model. Although there are fluctuations within the correlations and some years have a more significant value, the vast majority of coefficients remain the same positive or negative correlation across the years. There are some variables that vary. However, none of these variables have any significance, and only variables with low or no correlation were affected. Thus, there seems to be no significant difference between the years.

One general criticism of our method is that we base our analysis on data on a sample of FinTech firms as defined by Tillväxtanalys. We use their definition since it is the only way we could efficiently outline the sample. It is not clear if their definition of FinTech firms is aligned with other definitions that have, and will, be established within the research sphere. Furthermore, there might be a bias in their selection of FinTech firms. While we examined that all firms included in the sample size operate according to the definition of FinTech, we can not guarantee that there were no FinTech firms left out by Tillväxtverket. Nevertheless, in terms of their definition of FinTech, it is based on the Financial Stability Board (FSB) and Basel committee which should be seen as reliable.

Another limitation of this study is our limited scope of firms. We are excluding firms that are not based in Sweden which makes our analysis country-based and sensitive to country-wide factors. Since FinTech firms have no SIC code, and we only had access to data on Swedish FinTech firms through the author of the paper by Tillväxtanalys, this is the only convenient way to conduct this study. Furthermore, we are also excluding firms that don't have data for all three years, newly started firms, firms that have gone bankrupt, and companies that have merged. We are therefore only measuring a specific kind of firm. This shrinks the sample size and induces a risk that the companies with data for all years are not representative of the population of Fin-tech companies.

Lastly, there are contradicting opinions among researchers regarding what correlation with the leverage ratio that the trade-off theory and the pecking-order theory predict for each independent variable. Our hypotheses were formulated using past research and our subjective assessment which is prone to bias. Therefore, our results assessing the validity of the different theories for the different determinants and independent variables might not be as reliable as our purely numerical results.

Section VII. Conclusion

In this paper, the determinant factors of capital structure are examined in the Swedish FinTech industry. The results show seven significant determinants of capital structure. The correlations of independent variables reflect the industry and the characteristics of the firms. We can conclude that the average firm's characteristics include disruptive technologies with a lot of intangible assets, high growth, and high risk. This results in high information asymmetry and high agency costs, leading to difficulty in debt financing. One can conclude that the average Swedish FinTech firm is small, relatively young, has negative profitability, experiences high growth, is located in a major city, is liquid, and has a relatively large number of intangible assets.

This study concludes with significance that some firm characteristics incentivize firms to take up more leverage. As firms get bigger, more profitable, have higher non-debt tax

shields, and are located in major cities we can see that firms on average finance more of their operations with an increasing ratio of long-term debt and short-term debt. For firms that are more liquid and have more tangible assets, the long-term debt is increased while short-term debt is decreased.

This paper attempts to narrow a theoretical gap in the area of determinants of capital structure and FinTech firms. The empirical evidence with significant value should be seen as a significant contribution to the research of the determinants of capital structure in this industry. The obtained results can be useful for FinTech firms and investors. Furthermore, the government has an interest in this research in order to understand the challenges the FinTech industry faces in order to develop policies and regulations that can stimulate the growth of these innovative firms.

Further research should look at several countries and a longer period of time. It might also be interesting to further divide FinTech companies into categories of firms with different value propositions and study how these differ from each other. Finally, further research should broaden the scope of independent variables in order to get a more holistic understanding of the determinants of capital structure in the FinTech industry.

References

Berggren, B., Olofsson, C., Silver, L (2000). Control Aversion and The Search for External Financing in Swedish SMEs. Small Business Economics 15(3):233-242

Bradley, M., Jarrel, Gregg A., Jarrell, A., & E. Han, Kim. (1984). On the existence of an optimal capital structure: Theory and evidence. *The Journal of Finance*, *39*(3), 857–878.

Daskalakis, N., & Psillaki, M. (2008). Do country or firm factors explain capital structure? evidence from smes in France and Greece. *Applied Financial Economics*, *18*(2), 87–97.

DeAngelo, H., & Masulis, R. W. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics*, *8*(1), 3–29.

Deesomsak, R., Paudyal, K., & Pescetto, G. (2004). The determinants of capital structure: Evidence from the Asia Pacific region. *Journal of Multinational Financial Management*, *14*(4-5), 387–405.

Delicado T., Nuno N., Melo P., João F. (2015) Determinants of capital structure of the information technology industry. *The International Journal of Management Science and Information Technology 15.* 114-132

Dixon WJ. (1980) Efficient analysis of experimental observations. *Annu Rev Pharmacol Toxicol 1980;20:441-62.*

Ferri & Jones (1979). Determinants of financial structure: A new methodological approach. *The Journal of Finance*, *34*(3), 631–644.

Fisher, A. J., & Donaldson, G. (1962). Corporate debt capacity: A study of corporate debt policy and the determination of corporate debt capacity. *The Journal of Finance*, *17*(3), 554.

Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics*, *67*(2), 217–248.

Frank, M. Z., & Goyal, V. K. (2009). Profits and capital structure. *SSRN Electronic Journal*.

Ghasemi, M., & Hisyam Ab Razak, N. (2016). The impact of liquidity on the capital structure: Evidence from Malaysia. *International Journal of Economics and Finance*, *8*(10), 130.

Goldstein, I., Jiang, W., & Karolyi, G. A. (2019). To FinTech and beyond. *SSRN Electronic Journal*

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of Corporate Finance: Evidence from the field. *Journal of Financial Economics*, *60*(2-3), 187–243.

Hall, B. H. (2010). The financing of innovative firms. *Review of Economics and Institutions*.

Hang, Markus. Geyer-Klingeberg, Jerome. Rathgeber, Andreas. Stöckl, Stefan. (2017). Measurement Matters: A Meta-Study of the Determinants of Corporate Capital Structure. *The Quarterly Review of Economics and Finance*

Harris and Raviv (1990). Capital Structure and the informational role of debt. *The Journal of Finance*, *45*(2), 321–349.

Jensen and Meckling. (1976) *Theory of the firm: Managerial behavior, agency costs and ownership structure,* Journal of Financial Economics Volume 3, Issue 4 Pages 305-360

Jerbeen, M., & Alnori, F. (2020). Corporate geographical location and capital structure: Evidence from an emerging market. *International Journal of Economics and Financial Issues*, *10*(3), 174–186.

Jordan, J., Lowe, J., & Taylor, P. (1998). Strategy and financial policy in UK small firms. *Journal of Business Finance Accounting*, *25*(1&2), 1–27.

Kedzior, M., Grabinska, B., Grabinski, K., & Kedzior, D. (2020). Capital structure choices in technology firms: Empirical results from Polish listed companies. *Journal of Risk and Financial Management*, *13*(9), 221

Khan, A. G. (2012). The relationship of capital structure decisions with firm performance: A study of the engineering sector of Pakistan. *International Journal of Accounting and Financial Reporting*, *2*(1), 245.

Kieschnick, R., & Moussawi, R. (2018). Firm age, corporate governance, and Capital Structure choices. *Journal of Corporate Finance*, *48*, 597–614.

Kraus, A. and Litzenberger, R.H. (1973) A State-Reference Model of Optimal Financial Leverage. The Journal of Finance, 28, 911-922

Kumar, S., Colombage, S., & Rao, P. (2017). Research on Capital Structure Determinants: A review and Future Directions. *International Journal of Managerial Finance*, *13*(2), 106–132.

Lim, S. C., Macias, A. J., & Moeller, T. (2020). Intangible assets and Capital Structure. *Journal of Banking & Finance*, *118*, 105873.

Michaelas, N., Chittenden F., & Poutziouris. (1999). Financial Policy and Capital Structure Choice in U.K. SMEs: Empirical Evidence from Company Panel Data *Small Business Economics* Vol. 12, No. 2 pp. 113-130 (18 pages)

Miller, M. H., & Modigliani, F. (1963). Dividend policy and market valuation: A reply. *The Journal of Business*, *36*(1), 116

Modigliani, Franco, and Merton H. Miller. (1958) “The Cost of Capital, Corporation Finance and the Theory of Investment.” *The American Economic Review*, vol. 48, no. 3, pp. 261–97

Morellec, E. (2001). Asset liquidity, capital structure, and secured debt. *Journal of Financial Economics*, *61*(2), 173–206.

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, *5*(2), 147–175

Myers, S. C. (2001). Capital structure. *Journal of Economic Perspectives*, *15*(2), 81–102.
Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. Journal of Financial Economics Volume 13, Issue 2

Myers, Stewart C. (1984) "Capital Structure Puzzle," Journal of Finance, Vol. 39, No. 3, pp. 575-592.

Oztekin, O., & Flannery, M. J. (2008). Institutional determinants of capital structure adjustment speeds. *SSRN Electronic Journal*.

Panno, A. (2003). An empirical investigation on the determinants of capital structure: The UK and Italian experience. *Applied Financial Economics*, *13*(2), 97–112.

Rajan and Zingales (1995). What do we know about capital structure? some evidence from International Data. *The Journal of Finance*, *50*(5), 1421–1460.

Ross, S. A. (1977). The determination of financial structure: The incentive-signalling approach. *The Bell Journal of Economics*, *8*(1), 23.

Schueffel, P. (2016). Taming the beast: A scientific definition of FinTech. *SSRN Electronic Journal*.

Studenmund, A. H., & Johnson, B. K. (2011). *A practical guide to using econometrics*. Pearson sixth edition.

Swedish FinTech Association. FinTechrapporten tredje upplagan, 1-35 (2021)

The European Union (2003) *The new SME definition - EU SME centre*. (n.d.). 1-52

Tillväxtanalys, (2020), Svensk FinTech 1-79

Titman and Wessels (1988). The determinants of Capital Structure Choice. *The Journal of Finance*, *43*(1), 1–19.

Wald, J. K. (1999). How firm Characteristics Affect Capital Structure: An international comparison. *Journal of Financial Research*, *22*(2), 161–187.

Wang, X., Wang, J., & Johnson, L. (2016). Geography and capital structure. *Canadian Journal of Administrative Sciences / Revue Canadienne Des Sciences De L'Administration*, *35*(1), 107–122.

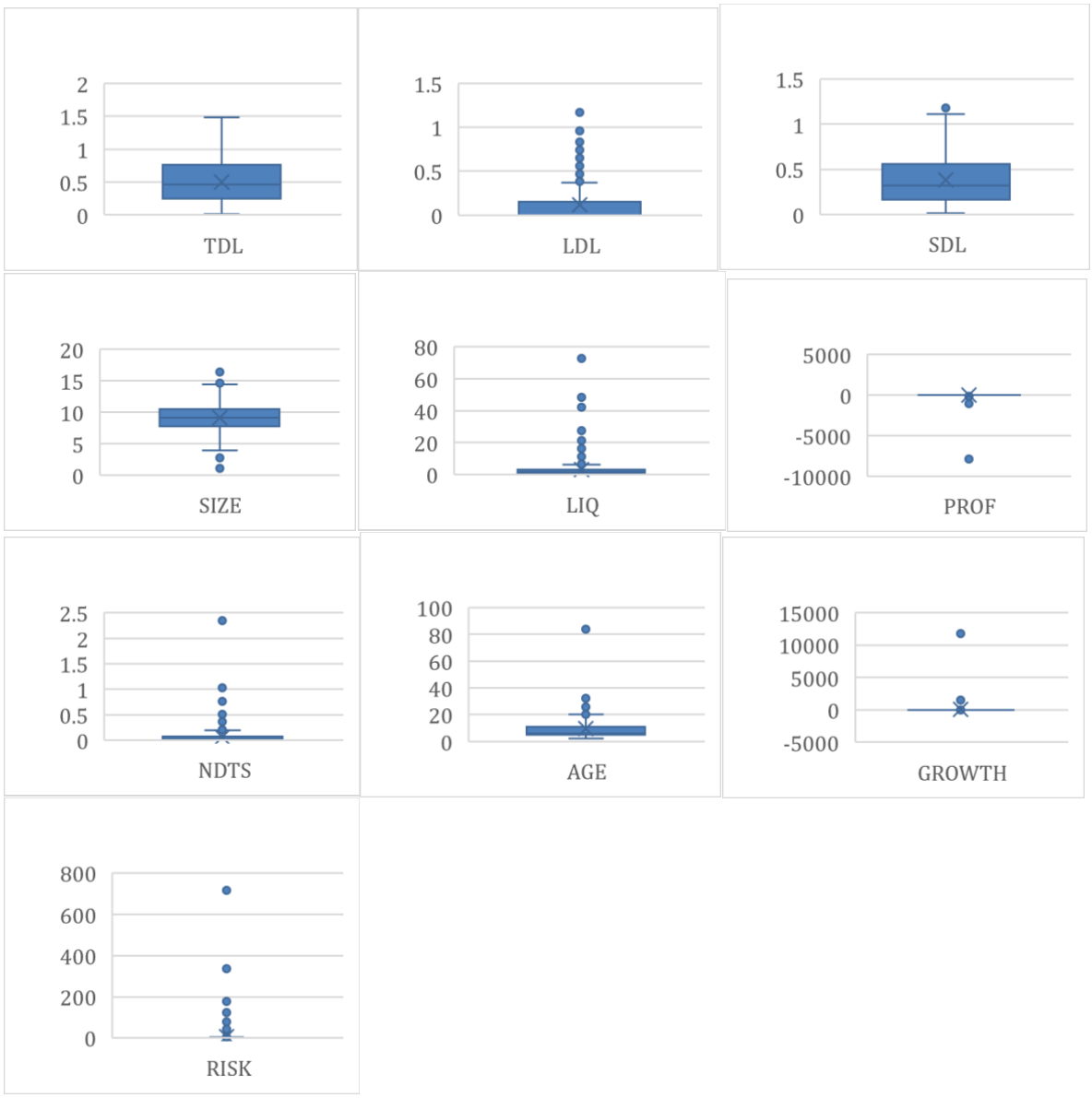
Warner, Jerold B. (1977) "Bankruptcy Costs: Some Evidence." *The Journal of Finance*, vol. 32, no. 2 pp. 337–47,

Welch, I. V. O. (2011). Two common problems in capital structure research: The financial-debt-to-asset ratio and issuing activity versus leverage changes. *International Review of Finance*, *11*(1), 1–17.

Zhang, Y. (2010). The product category effects on capital structure: Evidence from the smes of British Manufacturing Industry. *International Journal of Business and Management*, *5*(8).

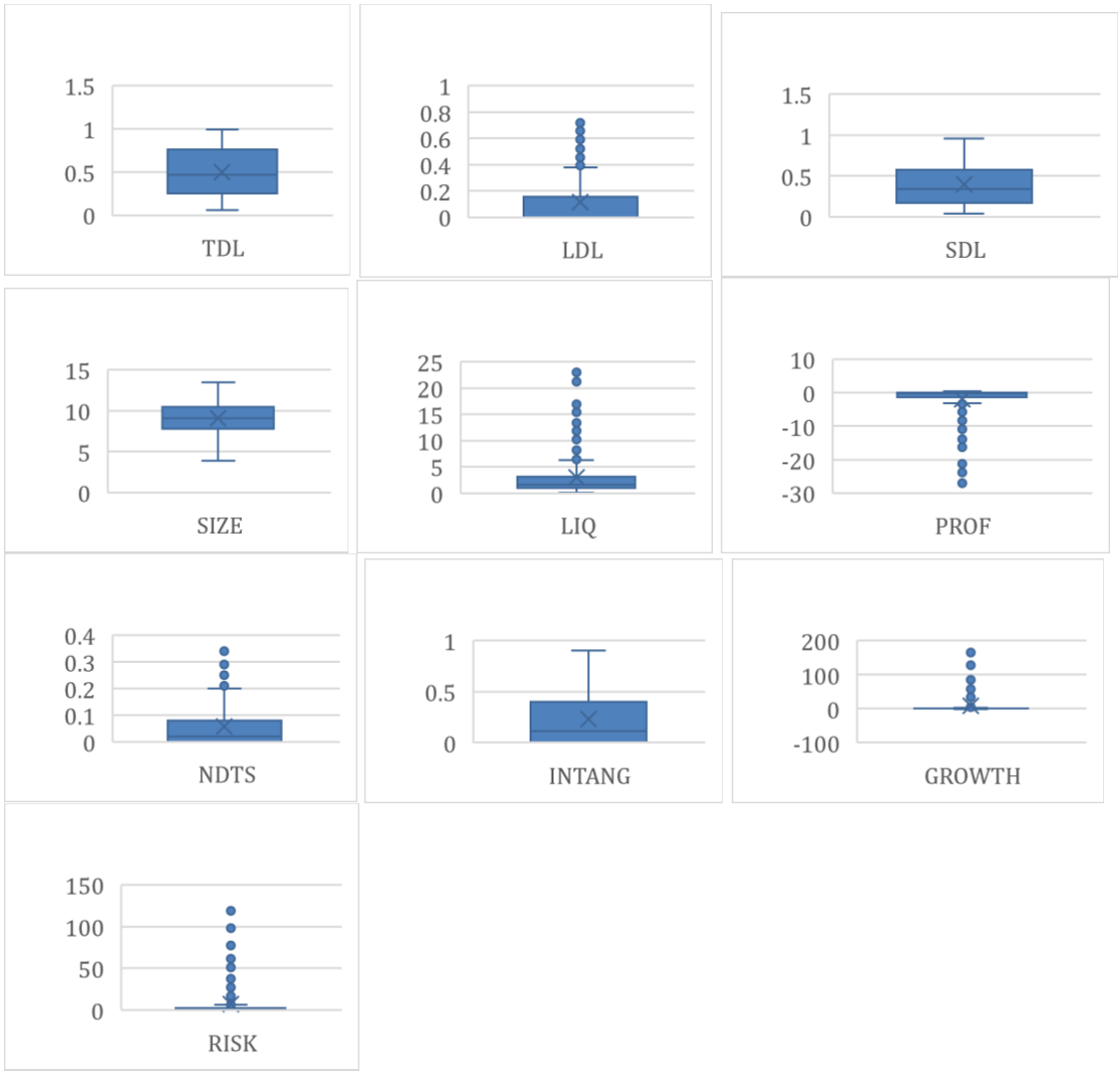
Appendix

Figure 1: Box Diagrams Before Winsorizing



Notes: This figure shows the empirical outcome of conducting box diagrams before winsorizing of 2.5 percent on the end of each tail of the data. The variables that were examined was TDL (total debt to assets), LDL (long-term debt to assets), and SDL (short-term debt to assets), SIZE (logarithm of sales), LIQ (current assets divided by current liabilities), PROF (EBIT divided by sales), INTANG (intangible assets divided by total assets), AGE (time since registration of business), NDTS (depreciation divided by total assets), GROWTH (growth in revenues) and RISK (standard deviation of change in EBIT).

Figure 2: Box Diagrams After Winsorizing



Notes: This figure shows the empirical outcome of conducting box diagrams after winsorizing of 2.5 percent on the end of each tail of the data. The variables that were examined was TDL (total debt to assets), LDL (long-term debt to assets), and SDL (short-term debt to assets), SIZE (logarithm of sales), LIQ (current assets divided by current liabilities), PROF (EBIT divided by sales), INTANG (intangible assets divided by total assets), AGE (time since registration of business), NDTS (depreciation divided by total assets), GROWTH (growth in revenues) and RISK (standard deviation of change in EBIT).

Table V

Summary of hypotheses and significant results

The table reports the predictions about the determinant factors made by the pecking order theory and the trade-off theory. The table displays the results of the correlation for each leverage variable. TDL (total debt to assets), LDL (long-term debt to assets), and SDL (short-term debt to assets), whereupon nine independent variables are used including SIZE (logarithm of sales), LIQ (current assets divided by current liabilities), PROF (EBIT divided by sales), INTANG (intangible assets divided by total assets), AGE (time since registration of business), NDTS (depreciation divided by total assets), GROWTH (growth in revenues), RISK (standard deviation of change in EBIT) and MAJOR (valued 1 if being located in Stockholms län, Västra Götalands län or Skåne län and 0 if not). The hypothesis and results are reported where a predicted positive correlation is denoted as a positive sign and a predicted negative correlation is denoted as a negative sign. A correlation of zero is denoted by n/a. Significant results are denoted by **bold text** and asterisks. Significance levels: *($p < 0.05$), **($p < 0.01$), ***($p < 0.001$).

Determinant factor	Tradeoff theory prediction	Pecking order theory prediction	TDL	LDL	SDL
Size (SIZE)	+ (H1)	- (H2)	**+ (H1)***	+ (H1)	**+ (H1)***
Liquidity (LIQ)	+ (H3)	- (H4)	**- (H4)*****	**+ (H3)*****	**- (H4)*****
Profitability (PROF)	+ (H5)	- (H6)	**+ (H5)****	**+ (H5)***	**+ (H5)***
Intangibility (INTANG)	- (H7)	+ (H8)	**- (H7)****	**+ (H8)*****	**- (H7)*****
Age (AGE)	+ (H9)	- (H10)	- (H10)	n/a	n/a
Non-Debt Tax Shield (NDTS)	- (H11)	+ (H12)	**+ (H12)*****	**+ (H12)***	**+ (H12)*****
Growth (GROWTH)	- (H13)	+ (H14)	+ (H14)	n/a	**+ (H14)****
Risk (RISK)	- (H15)	+ (H16)	n/a	n/a	n/a
Major City (MAJOR)	+ (H17)	- (H18)	**+ (H17)***	+ (H17)	**+ (H17)***

Table VI

Summary of Regression Analysis TDL Year 2018, 2019 and 2020

The table reports the regression analysis. The sample consists of data from 208 firms with a total of 2,080 observations for each regression. The data has been subject to winsorizing of 2.5 percent. The regressions use one dependent variable, TDL total debt to assets), whereupon nine independent variables are used including SIZE (logarithm of sales), LIQ (current assets divided by current liabilities), PROF (EBIT divided by sales), INTANG (intangible assets divided by total assets), AGE (time since registration of business), NDTS (depreciation divided by total assets), GROWTH (growth in revenues), RISK (standard deviation of change in EBIT) and MAJOR (valued 1 if being located in Stockholms län, Västra Götalands län or Skåne län and 0 if not). The table reports the significance level and the standard errors which are presented in parentheses. The three different regressions are divided into three columns. Regression (1) examines the year 2018. Regression (2) examines the year 2019. Regression (3) examines the year 2020. Significance levels: *($p < 0.05$), **($p < 0.01$), ***($p < 0.001$).

Variable	2018 (1)	2019 (2)	2020 (3)
Constant	0.504*** (0.125)	0.380*** (0.116)	0.258* (0.118)
SIZE	0.003 (0.013)	0.014 (0.011)	0.027* (0.011)
LIQ	-0.022*** (0.004)	-0.024*** (0.005)	-0.014*** (0.004)
PROF	0.006 (0.003)	0.007 (0.004)	0.021*** (0.006)
INTANG	-0.117** (0.089)	-0.243** (0.091)	-0.136 (0.083)
AGE	-0.003 (0.003)	-0.001 (0.003)	-0.001 (0.003)
NDTS	0.617* (0.278)	1.186*** (0.296)	0.845*** (0.242)
GROWTH	0.000 (0.001)	0.002 (0.001)	0.001 (0.002)
RISK	0.001 (0.001)	-0.001 (0.001)	0.003 (0.002)
MAJOR	0.089 (0.052)	0.072 (0.051)	0.031 (0.051)
Observations	2,080	2,080	2,080
R-Squared	0.241	0.255	0.340

Table VII

Summary of Regression Analysis LDL Year 2018, 2019 and 2020

The table reports the regression analysis. The sample consists of data from 208 firms with a total of 2,080 observations for each regression. The data has been subject to winsorizing of 2.5 percen. The regressions use one dependent variable, LDL (long-term debt to assets), whereupon nine independent variables are used including SIZE (logarithm of sales), LIQ (current assets divided by current liabilities), PROF (EBIT divided by sales), INTANG (intangible assets divided by total assets), AGE (time since registration of business), NDTS (depreciation divided by total assets), GROWTH (growth in revenues), RISK (standard deviation of change in EBIT) and MAJOR (valued 1 if being located in Stockholms län, Västra Götalands län or Skåne län and 0 if not). The table reports the significance level and the standard errors which are presented in parentheses. The three different regressions are divided into three columns. Regression (1) examines the year 2018. Regression (2) examines the year 2019. Regression (3) examines the year 2020. Significance levels: *($p < 0.05$), **($p < 0.01$), ***($p < 0.001$).

Variable	2018 (1)	2019 (2)	2020 (3)
Constant	0.015 (0.092)	0.034 (0.084)	-0.013 (0.095)
SIZE	0.004 (0.010)	0.001 (0.008)	0.006 (0.009)
LIQ	0.007* (0.003)	0.006 (0.003)	0.013*** (0.003)
PROF	0.003 (0.002)	0.003 (0.003)	0.006 (0.005)
INTANG	0.155* (0.065)	0.164* (0.066)	0.139* (0.066)
AGE	-0.001 (0.000)	0.000 (0.002)	0.001 (0.002)
NDTS	0.262 (0.203)	0.227 (0.216)	0.405* (0.242)
GROWTH	-0.001 (0.000)	0.001 (0.001)	-0.001 (0.001)
RISK	0.001 (0.000)	0.000 (0.001)	0.000 (0.001)
MAJOR	0.020 (0.038)	-0.001 (0.037)	-0.017 (0.041)
Observations	2,080	2,080	2,080
R-Squared	0.123	0.101	0.128

Table VIII

Summary of Regression Analysis SDL

The table reports the regression analysis. The sample consists of data from 208 firms from the period 2018 to 2020 which totals 2,080 observations for each regression. The data has been subject to winsorizing of 2.5 percent. The regressions use one dependent variable, SDL (short-term debt to assets), whereupon nine independent variables are used including SIZE (logarithm of sales), LIQ (current assets divided by current liabilities), PROF (EBIT divided by sales), INTANG (intangible assets divided by total assets), AGE (time since registration of business), NDTS (depreciation divided by total assets), GROWTH (growth in revenues), RISK (standard deviation of change in EBIT) and MAJOR (valued 1 if being located in Stockholms län, Västra Götalands län or Skåne län and 0 if not). The table reports the significance level and the standard errors which are presented in parentheses. The three different regressions are divided into three columns. Regression (1) examines the year 2018. Regression (2) examines the year 2019. Regression (3) examines the year 2020. Significance levels: *($p < 0.05$), **($p < 0.01$), ***($p < 0.001$).

Variable	2018 (1)	2019 (2)	2020 (3)
Constant	0.496*** (0.105)	0.415*** (0.098)	0.339* (0.118)
SIZE	0.000 (0.011)	0.007 (0.009)	0.017 (0.009)
LIQ	-0.030*** (0.004)	-0.032*** (0.004)	-0.029*** (0.003)
PROF	0.003 (0.003)	0.005 (0.004)	0.017*** (0.005)
INTANG	-0.271*** (0.075)	-0.418*** (0.077)	-0.297*** (0.066)
AGE	-0.001 (0.003)	0.001 (0.003)	0.000 (0.002)
NDTS	0.373 (0.233)	0.894*** (0.251)	0.485* (0.195)
GROWTH	0.001 (0.000)	0.001 (0.001)	0.002 (0.001)
RISK	0.000 (0.001)	-0.001 (0.001)	0.003 (0.001)
MAJOR	0.057 (0.044)	0.062 (0.043)	0.032 (0.041)
Observations	2,080	2,080	2,080
R-Squared	0.355	0.361	0.399