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HANDELSHÖGSKOLAN

The influence of capital structure on firm value and profitability during two opposite states of the economy

- An empirical study of Swedish listed manufacturing companies

Bachelor's Thesis in Industrial & Financial Management
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Abstract

This study investigates how changes in the capital structure of Swedish listed manufacturing companies influence equity value and return on assets during periods of economic recession and expansion. The purpose is to explain how Swedish manufacturing companies debt-to-equity ratios affect return on assets and equity value during two distinct economic phases. To achieve this, the study adopts a quantitative approach, analyzing data from 2008–2012 and 2015–2018, obtained from S&P Capital IQ. Four panel data regressions with fixed effects are conducted, two for each dependent variable (ROA and equity value), across both economic phases. The analysis is grounded in several theoretical perspectives, including the trade-off theory, dynamic trade-off theory, and the Modigliani & Miller theorem. Prior literature and empirical studies are also used to support the findings. The results reveal that a higher debt-to-equity ratio is positively associated with return on assets, especially during the recession period. This suggests that increased leverage can enhance operational performance in more uncertain environments. However, the study also finds that an increase in leverage negatively affects equity value across both economic phases, with a stronger negative effect observed during the expansion. These findings align with the dynamic trade-off theory, indicating that the optimal capital structure may vary depending on macroeconomic conditions. In summary, the analysis shows that while higher leverage can improve profitability during this economic recession, it may simultaneously lower equity value. The study underscores the importance of adapting capital structure decisions to the prevailing economic climate and brings evidence for more informed decision making aimed at stakeholders.

Keywords

Capital structure, Leverage, Debt-to-equity ratio, Profitability, Return on assets, Economic conditions, Recession, Expansion, Market capitalization, Equity value.

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1 Introduction

Debt and equity are used to finance a company's operations, and the debt-to-equity ratio simply shows in what proportion it is made. The ratio provides insight in how a company is financed and the financial risk the chosen structure could bring [2]. The capital structure of companies is an important factor in their financial performance [3][4] and can be adjusted to optimize their profitability, liquidity, risk and and value [5]. Economic conditions naturally fluctuate over time in response to external events around the world. Sweden i particular have a history with slow economic recovery after the financial crisis 2008 [6], so what are the immediate effects of changes in the capital structure on key financial indicators, and can the insights be used to handle these fluctuations more sophisticated?

1.1 Background

Sweden is a leading country in the manufacturing industry with a large number of consistent, world-leading companies such as SSAB, Atlas Copco, Sandvik, and ABB[7]. What strategies Swedish manufacturing companies use in order to optimize their capital structure and how this affects key metrics is a rather unexplored topic, which sparks an interest for the thesis authors.

There are multiple metrics for defining a company's capital structure and a common one is debt-to-equity ratio. Foundational theories such as the propositions of Modigliani & Miller and the trade-off theory, which evolved during the 70's and 80's from Modigliani & Miller, provide a framework for understanding how the variation of this ratio affects equity value under stable conditions. Kraus & Litzenberger [8] wrote one of these papers that serve as a foundation of the trade-off theory. Economic phases introduce complexities that challenge the ability to optimize capital structures in accordance to these theories. The research of Fischer et al.[9] investigates this and explains that they ignore the firm's optimal capital structure in response to fluctuations in asset values over time. Together they came up with their own theory, which today is called the dynamic trade-off theory, that generates predictions about companies' capital structure decisions that are not based on static leverage ratios. Their study found that firms allow the actual leverage ratio to deviate from the target ratio, which in some ways contradicts the theories of Modigliani & Miller. Research of the more modern time supports the dynamic trade-off theory, with one example being the research of Danis et al. [10], which explains that assumptions of firms frequently adjusting their capital structure are not always suitable.

A company's financial metrics, especially equity value are in many ways connected to its capital structure[11]. Equity value is described as the total worth of all the stocks and is affected by the market's expectations and reactions[12][11]. This financial metric is commonly used when

comparing publicly listed companies as well as it measures how valuable a company is. ROA measures how efficiently a company uses its assets to generate profit. To calculate companies financial performance, ROA is a solid central metric that allows comparison between different firm size's. The metric is also very broad and perspective that considers both net income and asset management.

Economic recession or expansion are terms which are determined by the level of economic activity in relation to a trend or equilibrium level. The Swedish konjunkturinstitutet (KI) emphasizes that both recession and expansion can be divided into two phases each which are described based on changes in GDP [1].

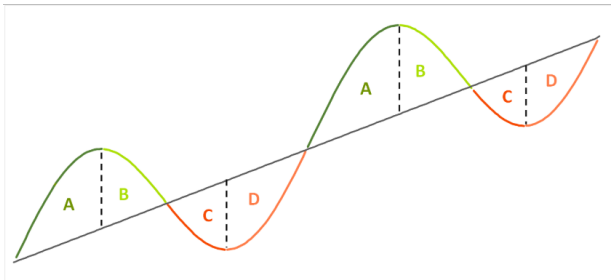

Fig. 1: Illustration of economic recession and expansion [1]

Phase A, which can be seen in Figure 1, represents an economic upturn and a relative increase in GDP. Following phase A is phase B which describes an economic deceleration which is explained by a relative decrease in GDP while remaining above average. The two phases of recession, C and D, represent the opposite phenomena. Phase C and phase D describe a decrease and increase respectively, while GDP is below average.

Regression analysis is a statistical method used to find the best linear relationship between one dependent variable with one or more independent variables. It will be used in this thesis to find out how changes in capital structure during economic recession or expansion affects profitability and it is a well established method in the field of economics. Since researchers are not totally in agreement about how firms manage their capital structure, it is difficult to form any clear expectations from a regression analysis.

1.2 Problem discussion

Capital structure is a fundamental aspect of corporate finance, as financial management aims to maximize shareholder value through strategic decisions regarding the mix of equity and

debt [13][14][15]. These decisions directly impact the financial risk and are highly dependent on internal as well as external factors, such as future expectations, corporate strategies, and economic conditions[16]. Modigliani & Millers propositions[5] [14], the trade of theory, and the dynamic trade-off theory together explains the puzzle of capital structure with taxes, transaction costs, variances in firm returns and proportional bankruptcy costs [9]. However, they do not incorporate the cyclical nature of economic conditions and how they may change the effect of capital structure on profitability and market capitalization of firms.

Capital structure is a well researched topic globally. related to this thesis research area, the effects of capital structure on firm performance in terms of ROA, ROE, EPS, and Tobins Q is the most frequently observed metrics used. According to a study examining Malaysian corporations in the period 1995-2011 [17], ROA, ROE, EPS and Tobins Q all have a negative correlation with capital structure except for a positive effect on Tobins Q. However, a study over Iranian companies in the period 2002-2009[18], have determined that EPS and Tobins Q are positively correlated with the capital structure, while the only significantly negative relationship is ROA.

There are not as many studies with a pure focus on how capital structure affects firm value, compared to profitability and firm performance in broad terms, and the results are inconsistent here as well. Although the majority of these studies include measurements of the Tobins Q (1) a metric that is used for valuation of assets it can not be interpreted exactly in the same way as total market capitalization, equity value, as they are not the same metric. However L. Uzliawati et al [19] states that the debt-to-equity ratio have a positive influence on firm value measured by price to book value, when examining 101 companies on the Indonesian stock exchange during the period 2012-2018. In contrast with Duc Huu Luu [20] that studied 23 Vietnamese companies in the chemical industry during 2012-2019 and observed a negative relationship between debt to assets and Tobins Q.

Further more Levy & Hennessy [21] provides a general equilibrium model, that predicts how capital structure in terms of debt-to-equity changes over varying macroeconomic conditions in alignment with empirical evidence. The results show that depending on the firms financing flexibility the ratio will ether increase or decrease in the same macroeconomic condition, making this research question even more complex by addressing how context dependent the capital structure choices are. But studies have not investigated Swedish corporations in this exact manner yet. Despite the significance of this issue for corporate sustainability and growth, there is a gap in the current research regarding this. Effective management of debt and equity is crucial for long-term shareholder value creation [13]. Yet the optimal strategy may vary depending on whether the economy is experiencing a recession or an expansion, derived by the change in risk aversion and expectations from investors [22]. Understanding these dynamics is essential for businesses seeking to optimize shareholder value under varying economic conditions.

The current studies on Swedish companies within this area is investigating the effects of economic crises on corporate capital structure [23], how capital structure affects stock returns [24], and how the debt-to-equity ratio affects profitability measured by ROE [25]. Furthermore, one study in particular came closer to this thesis purpose among the existing literature related the to Swedish market. By determining the effect of the debt-to-equity ratio on enterprise value during the period 2014-2019, and obtaining a negative correlation between the two metrics [26]. These four Swedish papers address similar subjects, but can not provide answers to the research question by themselves nor together without additional research being done.

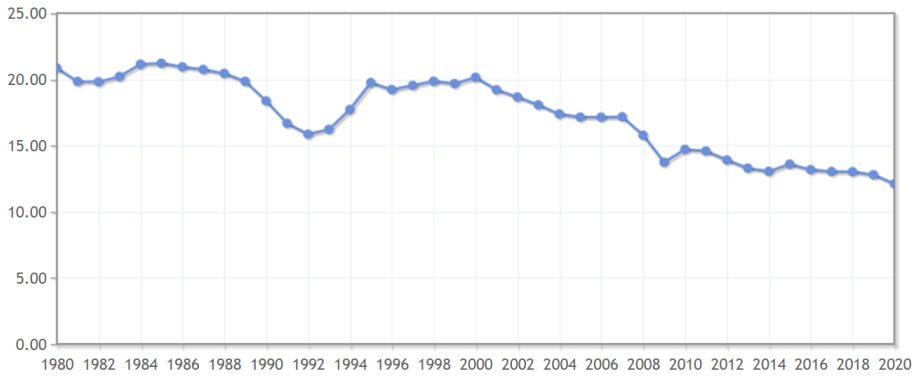

Fig. 2: Sweden - Manufacturing, value added (% of GDP)

Since 1870 Sweden's manufacturing industry has been the largest segment driving GDP up, contributing to the domestic economic growth, increasing welfare, and developing the society to the wealthy country it is today [27]. However, the contribution of added value from the industry to GDP has decreased over the last 40 years, at a steady rate from 20.87% to 12.12% of GDP [28] illustrated in Figure 2. The reason behind this is partly because of an increase in demand from the service sector, from 56.72 % to 66.14 % [29] viewed in Figure 3, and not from a decrease in demand within the manufacturing sector.

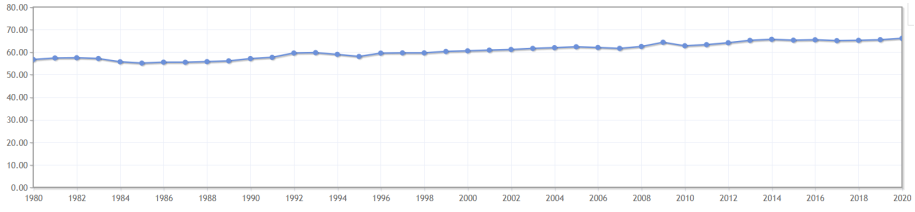

Fig. 3: Sweden - Services, value added (% of GDP)

The majority of companies included in this study will also have a global presence, and be strongly intertwined with other international markets due to large export amounts. According to Tradingeconomics[30] the total value exported under 2023 was 55% of GDP including goods and services. The machinery and transport commodities alone stand for over 40% of the total

exported goods in 2024 [31], Initially making them vulnerable to changes in the economy of other countries and continents[6]. As proven by Sweden in particular having a history with a strong economic reaction and slow recovery after the financial crisis 2008, the insight from this study could therefore increase understanding about how companies could reduce the financial consequences of international shocks in the economy on Swedish companies.

Existing theories such as the Modigliani & Miller capital structure theorem and the trade-off theory offer differing perspectives on capital structure decisions. However, they do not fully capture the nuances of how firms adjust their capital structures across varying economic phases. In particular, the dilemmas firms face when adapting their debt-to-equity ratio often involve weighing the tax advantages of debt financing against the increased financial risk and reduced operational flexibility that accompany higher leverage[5] [13].

Despite the importance of these trade-offs, empirical analysis focusing specifically on public manufacturing companies in Sweden, and how their capital structure decisions influence profitability and market capitalization under differing economic conditions, has not yet been thoroughly explored. This study seeks to fill that gap by providing empirical insights that complement and extend the existing theoretical frameworks as well as literature.

By generating practical findings, this research aims to offer valuable guidance to company managers and financial stakeholders, supporting more informed decision-making that can strengthen firms' financial stability and unlock greater growth potential. If decision-makers in large manufacturing companies can enhance profitability, defined as (ROA) and market capitalization respectively (equity value), both during recessions and periods of economic expansion, this may not only improve firm-level outcomes but also contribute to domestic economic growth due to the large impact on GDP they have [28] and, in turn, foster broader economic development.

1.3 Purpose

The purpose of this study is to explain how the debt-to-equity ratio affects firm performance. This will be measured by return on assets and equity value, in publicly listed Swedish manufacturing firms, during two distinct economic phases. The analysis focuses on the recession period from 2008 to 2012 and the expansion period from 2015 to 2018. By comparing these phases, the study aims to determine whether the relationship between capital structure and performance varies with broader economic conditions. This contributes to a deeper understanding of how these firms adapt their financial strategies in response to changing macroeconomic environments.

1.4 Research question

How do adaptations in the capital structure of Swedish listed manufacturing companies during economic recessions and expansions affect equity value and return on assets?

1.5 Economic phases

The period 2008 to 2012 was characterized by global economic instability, slow recovery and significant changes in financial environments. This was followed by the financial crisis that occurred between 2007 to 2009. As a result of the crisis this period saw a major decrease in industrial production and global trade [6]. Most global economies entered a recession and the recovery period was uneven. Some countries, such as the United States and Germany, had recovered by 2010 while other countries, such as Sweden, saw a protracted recovery that lasted until 2012 [32]. During the period 2008 to 2012 Sweden was, according to KI, in a recession (personal communication, Magnus Åhl, 2025)[1].

The second period, 2015 to 2018, was characterized by global economic growth and low interest rates. Entering this period, companies across different economies had recovered from the previous recession and saw a time of increased economic growth and an increase in investments. During this period, external financing was not a problem like for the previous period [33]. Sweden also saw strong growth and entered, according to KI [1], a period of expansion. Additionally, in this time period, industrial companies saw favorable financing conditions and a shift in global trade dynamics.

1.6 Delimitations

The delimitations of this study are Swedish publicly listed manufacturing companies. Only companies that were listed during the two economic phases, 2008 to 2012 and 2015 to 2018, will be taken into account. However, a company that was listed during one of the two economic phases, will be analyzed for that period. This implies that the two samples may have different amount of observations.

1.7 Outline

The coming chapters will examines how Swedish manufacturing companies adapt their capital structure during economic fluctuations and how this affect profitability and equity value. While existing research explores capital structure in different regions, industries and periods, few studies analyze how companies adapt financing strategies during contrasting economic cycles, particularly in Sweden's manufacturing sector. This research fills that gap by comparing recession (2008–2012) and expansion (2015–2018) periods, offering insights for corporate decision-making and investment analysis. This study builds on financial theories and previous research papers. The main theories will be the trade-off theory, dynamic trade-off theory, and Modigliani & Miller's theorem. Existing research shows conflicting global results where U.S. studies suggest that leverage has a positive effect on ROA but Malaysian data showing negative effects. The central question examines how debt-to-equity ratio changes have an impact on profitability and equity value across recession (2008–2012) and expansion (2015–2018) periods. Using Capital IQ data, 72–130 Swedish listed manufacturers were analyzed, measuring leverage effects through panel data regressions with fixed effects. Among the control variables were revenue, liquidity, and asset turnover. Robustness checks was conducted through Hausman tests to ensure reliability. The findings will both guide corporate financing strategies during economic shifts and validate the dynamic trade-off theory in a new context.

2 Theoretical framing and literature

The following chapter will carefully describe the theories that the thesis revolves around and also present the current supporting literature. The theoretical framework is a vital part of the research since it will provide a stronger support and understanding of the research question. Based on the literature and current research, two hypotheses will be conducted. Table 1 and Table 2 is a summary of all the major theories and research papers relevant for the thesis.

2.1 Central theories

2.1.1 Trade-off theory

A state-preference model of optimal financial leverage [8] advances the trade-off theory by integrating corporate taxes and bankruptcy costs into a state-preference framework to determine a firm's optimal capital structure. Departing from the ideas of MM, where company value is not affected by leverage, the authors introduce imperfect markets. These imperfect markets has tax-deductible interest payments that increase firm value through tax shields, while bankruptcy penalties in insolvent states reduce it. It focuses on determining an optimal debt level that maximizes firm value in theory during a single-period framework. By only assuming a single-period valuation model, the trade-off theory becomes static. The core of the theory is based on the trade-off between tax advantages of debt and cost of financial distress. According to the theory, companies that seek to maximize shareholder value also aim for an optimal debt-to-equity ratio. This implies that companies with a more satisfactory goal do not necessarily aim to optimize its capital structure like the theory states. To reach the optimal capital structure, the theory suggests that companies should increase debt until the tax shields marginal benefit is equal to the marginal cost of financial distress. This creates an inverted U-shape. Moreover, the trade-off theory works as a central framework to gain better understanding of corporate financing [8].

2.1.2 Dynamic trade-off theory

The dynamic trade-off theory is an evolved version of the regular one, written by Fischer et al. [9]. The dynamic trade-off theory takes into consideration that it may be costly to adjust the capital structure and that economic situations have an affect on capital structure. This version not only recognizes the cost of adapting but also market imperfections and uncertainty in the economic environment. By using continuous-time framework, thus taking the economic environment into account, it makes this version more dynamic, hence the name. Moreover, the dynamic trade-off theory is based on the idea of continuous adaptations due to both internal

and external changes which enables companies to deviate from their optimal capital structure at times. The dynamic trade-off theory explain how and why companies make capital structure adjustments gradually over time and not immediately which is an important part to answer the research question. The theory can partly explain how companies capital structure evolve over time and why it is not fixed [9]. Moreover, the theory also serves as a tool of comparison to test the results of the research and may be confirmed in the final results.

2.1.3 Modigliani & Miller theorem

The Modigliani and Miller theorem examines the relation between companies overall value with the capital structure. The theorem consists of two different propositions and can provide the study with relevant insights into potential value implications of different financing decisions. The first proposition explains how companies value is independent of its capital structure in a world without taxes, asymmetric information and bankruptcy costs. This implies that regardless of how the company is financed, it does not affect the company value. This is because investors can create a homemade leverage replicating a company's debt-to-equity ratio on their own. After receiving criticism for this unrealistic proposition, they came up with a second one, including taxes. The second proposition states that cost of equity increase with taking on more debt. Simply because more debt also increase equity holders financial risk and therefore they demand a higher rate of return [14][5].

2.2 Literature review

A study by Danis et al. [10] present a dynamic perspective on how firms manage their capital structure over time, offering evidence that supports the dynamic trade-off theory rather than a static view. Instead of constantly adjusting leverage to maintain an optimal ratio, their findings indicate that firms allow capital structure to drift and only make changes when conditions justify the cost of doing so. The study investigated companies from the Compustat database, consisting of U.S publicly listed firms, between 1984-2011. Their analysis of these firms show that changes in leverage are not frequent. Instead, such adjustments often follow periods of increased profitability, suggesting that firms respond to internal improvements by taking on more debt. This behavior implies that leverage decisions are not based on a fixed target but rather made when internal signals, for instance earnings growth, indicate a favorable time to refinance or restructure. This pattern supports the idea that adjustment costs and market frictions prevent continuous rebalancing. It also suggests that firms tolerate deviations from their optimal structure until it becomes efficient to realign. To measure profitability, they used operating income before depreciation divided by total assets. As their debt measure, they used book

leverage by taking both long- and short term debt divided by total booked assets. Their use of regression models and event studies reveals a strong correlation between positive profit shocks and subsequent increases in leverage. These insights support the aim of this report and enable comparisons between companies in different regions during both the same and different time periods.

Brank & Hadley [16] have conducted a study where they investigate how CEO's with experience from leading a company during an economical recession or expansion manage the capital structure during new shifts in the economical environment. Their research focuses on a large sample of S&P 1500 firms over the period 1992 to 2015, offering long-term insights into how leadership experience influences financial decision-making. The authors introduce the concept of a "Recession CEO", defined as an executive who has previously led a company through a recession. Their findings reveal that these CEOs exhibit distinct capital structure behavior. They display a more aggressive approach, increasing leverage by approximately 12%, primarily to finance acquisitions and capital expenditures. This counter-cyclical strategy aims to take advantage of lower asset prices and investment opportunities that arise during economic slowdowns. The increased debt usage in downturns was found to be associated with higher asset growth and improved firm value, ultimately leading to an increase in return on assets. This study contributes to the understanding of capital structure dynamics by highlighting how managerial experience shapes risk preferences and financial strategy. It also provides empirical support for the idea that capital structure decisions are not solely determined by firm fundamentals or market conditions, but also by the characteristics and past experiences of decision-makers. Their insights add depth to traditional capital structure theories and offers a valuable complement to this thesis. Their focus on managerial experience provides an additional lens through which such strategic financial decisions can be understood.

Salim & Ydav [17] have used panel data regression to study 237 Malaysian listed companies and their performance between 1995-2011. They investigate how ROA, ROE, Tobins Q, and EPS is affected by different types of debt including long term debt, short term debt and total debt ratios. They analyzed this across six different sectors: consumer product, construction, plantation, industrial products, trading/services and, property. The study found that higher debt levels generally had a negative effect on ROA, suggesting reduced operational efficiency. However, Tobin's Q was positively related to debt, especially in the consumer and industrial product sectors. This indicates that investors may view leverage as a signal of growth potential. The findings highlight that the relationship between capital structure and profitability is both metric and sector dependent. This contributes a perspective that aligns with the focus of this thesis.

$$TobinsQ = \frac{\text{Book value of total debts + Market value of equity}}{\text{Book value of total assets}} \tag{1}$$

The study written by Szutowski [34] investigates the impact of macroeconomic variables on corporate profitability across 19 economic sectors in Poland over the period 2004–2021, utilizing a neural network model. The analysis incorporates a range of key economic indicators, including GDP, the Consumer Price Index (CPI), the Producer Price Index (PPI), the National Bank of Poland's reference interest rate, investment outlays, R&D expenditures, innovation activities, and the number of patents granted. These macroeconomic factors are examined alongside several measures of profitability that are, return on equity, return on assets, return on invested capital, and return on sales. The findings highlight CPI, interest rates, GDP, and PPI as the most influential determinants of firm profitability, with CPI emerging as the most significant factor. Overall, Szutowski's study underscores the critical influence of external macroeconomic conditions on corporate financial outcomes.

The study conducted by Amromin and Sharpe [22] investigate how individual investors form expectations about stock returns and risk in response to macroeconomic conditions. By using data from Gallup/UBS and Michigan consumer surveys, the authors conducted panel data regressions and found that investors expect higher returns and lower risk when they believe the economy is improving. This contrasts sharply with standard asset-pricing models, which predict counter cyclical expected returns due to higher risk premiums during recessions. Investors who expect higher returns or lower uncertainty tend to allocate more of their portfolios to equities. These patterns hold even among wealthier respondents, whose decisions are more likely to affect market outcomes. The study also found that during economic expansions, investors tend to become more optimistic and expect stronger market performance and reduced volatility. In contrast, during recessions, when traditional theory suggests risk premiums should rise to compensate for greater uncertainty, the average investor actually lowers their return expectations and perceives greater risk.

A study made by Uzliawati et al. [19] explored how capital structure affects firm value in a sample of 101 Indonesian manufacturing companies from 2012 to 2015. Using multiple linear regression, they assessed the influence of four key ratios: debt-to-equity ratio, debt-to-asset ratio, long term debt-to-equity ratio, and long term debt-to-asset ratio, with firm value measured by price to book value. Their study found that debt-to-equity ratio and long term debt-to-asset ratio had a significant and positive relationship with firm value. This finding suggest that firms could enhance their firm value by using debt connected with the trade-off theory. However, the author also found that long term debt-to-equity ratio had a significant and negative effect on firm value. Overall, the study is supported by the trade-off theory and shows the importance of balanced capital structure to improve profitability, especially in an emerging market like Indonesia.

Hirdinis [35] study on Indonesian mining companies among relationships with profitability analyzed the effects of capital structure on equity and firm value. The study used data from 47 mining firms listed on the Indonesia Stock Exchange between 2011 and 2015, employing path analysis and multiple linear regressions. The key findings of their study showed that debt-to-equity ratio had a significant and positive effect on firm value measured by price to book value. However, firm size had a significant and negative effect on firm value but a positive one on profitability. The results indicate that in the mining sector, capital structure contributes positively to firm value, but firms of greater size may reduce it.

2.3 Hypothesis development

Based on the presented theories research papers and how they are intertwined with the research question of this thesis, the following hypotheses has been constructed:

H0: There is no statistically significant relationship between the debt-to-equity ratio and either ROA or equity value of Swedish listed manufacturing companies, regardless of the economic phase.

H1: During economic recessions, an increase in the debt-to-equity ratio has a positive effect on ROA in Swedish listed manufacturing companies.

H2: During economic expansions, an increase in the debt-to-equity ratio has a positive effect on ROA in Swedish listed manufacturing companies.

H3: During economic recessions, an increase in the debt-to-equity ratio has a positive effect on equity value in Swedish listed manufacturing companies.

H4: During economic expansion, an increase in the debt-to-equity ratio has a positive effect on equity value in Swedish listed manufacturing companies.

2.4 Summary of literature review

Table 1: Summary of contributing articles and research papers (Part 1 of 2)

Authors	**Methodology**	**Topic/Conclusions**
Kraus, Alan; Litzenberger, Robert H. [8]	Theoretical modeling	Optimal leverage involves a trade-off between tax advantages and bankruptcy costs
Fischer et al. [9]	Theoretical modeling	Small recapitalization costs lead to wide swings in debt ratios; debt ratio range, not static leverage, reflects capital structure relevance
Danis et al. [10]	Event study and regression analysis	Firms tend to increase leverage during economic expansion. Increases in profitability forecast refinancing events.
Brank & Hadley [16]	Event study and regression analysis	Recession CEOs adopt conservative strategies during expansions. During a recession, the same CEO's increase leverage and debt.
Modigiliani & Miller [5]	Mathematical modeling	Fundamental propositions about enterprise value
Modigiliani & Miller [14]	Mathematical modeling	Fundamental propositions about enterprise value
Salim & Ydav [17]	Panel data regression	Higher debt levels generally had a negative effect on ROA.

Table 2: Summary of contributing articles and research papers (Part 2 of 2, continued from Table 1)

Authors	**Methodology**	**Topic/Conclusions**
Szutowski [34]	Neural network model	CPI, interest rates, GDP, and PPI as the most influential determinants of firm profitability.
Uzliawati et al [19]	Linear regression	Debt-to-equity ratio and long term debt-to-asset ratio had a significant and positive relationship with firm value.
Hirdinis [35]	Path analysis and linear regression	Debt-to-equity ratio has a positive and significant effect on firm value.
Amromin et al. [22][12]	Panel data regression	Investor behaviour during different economic phases.

3 Method

To investigate the results of the research question, this study will use linear regression methods. Equation (2) describes the basic description of a regression model where Y is called the dependent variable and X is called the independent variable. The characteristics of the regression line, which in this easy model would be described by β_1, explains the relation between the two variables. In order to better capture the problem of this thesis, a more developed regression model will be executed.

$$y = \beta_0 + \beta_1 X_1 + \varepsilon \tag{2}$$

One ambiguity regarding creating regression models is capturing the *ceteris paribus* relationship between X and Y [36]. Ceteris paribus means "other relevant factors being equal" and what researchers want to specify is if there are any other important factors that could affect Y even if X stays the same. Several control variables will be added to reduce omitted variable bias when studying the main independent variable, which in this case is debt-to-equity ratio. This thesis will use a panel data regression model, a technique that adds a crucial time dimension to standard cross-sectional data, allowing researchers to study changes within individuals over time [37]. More specifically, it will be a panel data regression with fixed effects. Fixed effects models includes unobserved, time-invariant differences across companies by focusing on within-unit changes. By doing so, the model controls for company specific factors that does not differ over time [37]. A contradicting method is using a random effects model which instead of assuming that individual characteristics of companies are correlated to the control variables, treats the effect variable as one with no correlation to the non-dependent variables. Depending on the research purpose and data set one model could be more beneficial than the other. After adding control variables, fixed effects and lagged variables, the regression model will look as following:

$$Y_{it} = \beta_0 + \beta_2 X_{1,it} + \beta_3 X_{2,it} + \beta_4 X_{3,it} + \alpha_i + \varepsilon_{it} \tag{3}$$

This regression model will be used four times. Two times for studying how debt-to-equity ratio affects ROA and equity value each during an economic recession and two for economic expansion respectively. One could argue that dummy variables for recession and expansion is another way to design the model. However, when experimenting with different control variables and trying to find the best model it is fewer things to view at once if the regressions are separated, thus four different regressions will be done. The resulting values of the coefficients will remain the same no matter if dummy variables are used or not. A drawback with performing a regression analysis in order to answer the research question of this thesis is that it does not

prove anything. It only shows whether changes in capital structure correlates with financial performance or not during shifts in economic environments, but can never be considered as proof. Another method would have been to conduct interviews with field experts or with CEO's that has experience of managing a firm during changing economical environments. However, it is not possible to include near as much companies in such a study, which strongly indicates that the chosen method is valid.

3.1 Identifying economic phases

The first step in performing the regression analysis will be to identify one period with economic recession and one period with economic expansion. KI will provide the right data to select appropriate time spans for the different economic phases. A period that lies 0,5% away from the normal GDP growth is a suitable definition for recession and expansion (personal communication, Magnus Åhl, 2025). With that in mind, the chosen periods are 2008-2012 and 2015-2018. The recession period 2008 to 2012 cover the aftermath of the financial crisis which was characterized by increased bankruptcies as well as reduced consumer expenditure and investments [38][39]. The expansion period was a phase of steady growth and economic recovery where companies saw increased confidence among consumers and increased corporate earnings [40].

3.2 Collection of data

S&P is a world leading provider of financial data and is widely used among researchers within econometrics [41]. The data will be collected through S&P' Capital IQ's, using their screening tool also frequently used in both academic and industry work. The database contains both private and public companies. Swedish listed manufacturing companies is the targeted group for this thesis and retrieved by selecting the following criterias in the screening tool.

1) Geographic Locations: Sweden
2) Company Type: Public Company
3) Industry Classifications: Capital Goods

The second criteria implies that the retrieved companies is public when the screening is made but not necessarily in the periods this research will analyze. This suggests that several companies in the data set potentially became public during the time period 2008-2025. The datasets for the different time periods will therefore vary in terms of specific-and number of companies after the raw data has been cleaned. The cleaning process has two steps: first, manually removing companies with zero equity value or ROA (likely private firms, data errors, or halted stocks);

second, using Stata's listwise deletion, which automatically drops observations with missing values.

In order to manage outliers, data winsorization by the 5th and 95th percentile will be used when necessary, determined by analyzing the variables via Stata. This approach is chosen in the interest of maintaining all values to keep the data as realistic as possible while still accounting for any errors. This means that the lowest and highest 5% of the data points in each category will be assigned the same value.

3.3 Regression analysis for equity value

To capture how debt-to-equity ratio affects equity value, the regression model in equation (4) will be implemented.

$$\begin{aligned} \ln\_\text{Average\_EV}_{it} = {} & \beta_1 \,\text{DER}_{it} + \beta_2 \,(\text{ROA}_{it}) + \beta_3 \,\text{Asset\_turnover}_{it} + \beta_4 \,\text{Tangible\_assets}_{it} \\ & + \beta_5 \,(\text{Total\_revenue}_{it}) + \beta_6 \,\text{Beta}_{it} + \beta_7 \,\text{Liquidity}_{it} + \beta_8 \,\text{Dividends}_{it} \\ & + u_i + \varepsilon_{it} \end{aligned} \tag{4}$$

3.3.1 Variables

Dependent variable

Equity value - The dependent variable. It is an average of the stock price the last day in each quarter of the fiscal year and will represent the price during the year. The changes in this variable is what the regression aim to explain. Unlike enterprise value that consist of both debt and equity, equity value only consists of equity and accounts for shareholders interest. To calculate this, the following formula is applied:

$$\text{Equity Value} = \text{Shares outstanding} * \text{price per share} \tag{5}$$

Logarithmic values will be used for equity value to reduce skewness.

Main independent variable

Debt-to-equity ratio - calculated from the balance sheet at the end of each fiscal year. The effect on the dependent variable from changes in this one will be the focus. A higher ratio means a higher leverage, which implies a higher financial risk[5]. The metric will be directly

retrieved from Capital IQ which use the following formula to compute it:

$$D/E = \frac{\text{Total Debt}}{\text{Equity}} \tag{6}$$

Control variables

ROA, Asset turnover, Tangible assets, Total revenue, Beta, Liquidity and Dividends will be used as control variables in this regression. The reason for these choices is mainly because they ether have a theoretical or empirical connection to Equity value and this research question, explained individually down below.

ROA (Return on Assets) - one of the main measurements describing a company's profitability and how efficiently they utilize their assets to generate profit. Husna & Satria [42] showed in an empirical study over Indonesian companies that it had an effect on firm value which is connected to equity value.

$$ROA = \frac{\text{Net income}}{\text{Total Assets}} \tag{7}$$

Asset Turnover - A metric used to describe a company's efficiency to generate revenue compared to its total assets. Used in the Vietnamese study as a control variable for Tobins Q with high significance[20].

$$ATO = \frac{\text{Total Revenues}}{\text{Average Total Assets}} \tag{8}$$

Tangible Assets - The total value of tangible assets on the balance sheet, is the main component when evaluating a company's financial collateral for securing loans. A company with a high ratio of tangible assets compared to intangible, will probably result in a lower financial risk due to the possibility of liquidation, translating into better financial flexibility. This control variable was used in the study with a significant effect on Tobins Q[20].

Total Revenue - Total sales over the fiscal year, representing company size. Based on the trade-off theory, and Rehan et al. [43] emphasizes that one may expect positive relationship with between firm size and leverage.

Beta - (one year beta) it is the slope of the 52 week regression line of the percentage price change of the stock relative to the percentage price change of its benchmark, in this case Morgan Stanley Capital international (MSCI). Initially representing the systematic risk of the company, a vital component in the valuation model Capital Asset Pricing Model (CAPM)[44].

Liquidity - the total amount of cash and cash equivalents, in general cash equivalents are investments maturing in less than three months. Indicates a company's short term financial risk and general health [45].

Dividends - The total amount payed out to the company's shareholders within the fiscal year, based on the company's most recent earnings. Indicates the financial stability and future expectations for the company. This control variable is used in the study written by Danis et al. [10] where Market leverage = Book debt / (Book debt + Market equity)9, is the dependent variable, including equity value. Market equity = share price × outstanding shares 5.

$$Market\ leverage = \frac{\text{Book debt}}{\text{Book debt + Market equity}} \tag{9}$$

3.4 Regression analysis for ROA

Unlike the case of how debt-to-equity ratio affects equity value, the results on ROA does not show directly. The market have the ability to react on, for example, a firm's announcement of a loan immediately while changes in capital structure affects ROA first on next fiscal year's balance sheet. In order to neutralize this, lagged variables will be used for this regression model. Some values, such as ROA, will be used from 2019 given the assumption that companies who made changes in capital structure to cope with the recession during 2018 did not now that the recession would end that year. Since the eventual change in debt-to-equity ratio was made during the recession and that the model uses lagged variables, it is necessary to include values from 2019 as well. The regression model for analyzing how changes in debt-to-equity ratio affects ROA during economic recession and expansion is illustrated in equation (10).

$$\begin{aligned} \text{ROA}_{it} = {} & \beta_1 \,\text{ROA}_{i,t-1} + \beta_2 \,\text{DE}_{i,t-1} + \beta_3 \,\ln(\text{EBIT}_{it}) + \beta_4 \,\ln(\text{TotalRevenue}_{it}) \\ & + \beta_5 \,\ln(\text{TotalAssets}_{it}) + \beta_6 \,\text{Cash}_{it} + \alpha_i + \varepsilon_{it} \end{aligned} \tag{10}$$

3.4.1 Variables

The main dependent variable in this regression is the Return on Assets. To calculate this measure, the following formula is applied:

$$ROA = \frac{\text{Net income}}{\text{Total Assets}} \tag{11}$$

Main independent variable

Debt-to-equity ratio will be the independent variable which seek to explain changes in the dependent variable.

Control variables

EBIT - earnings before interest and taxes, serves as a direct measure of a company's operational efficiency. It reflects the ability to generate earnings from core business activities before the influence of interest and taxes. By the accounting principals, EBIT has a direct effect on net income which in turn is a part of calculating ROA. Thereby EBIT is a relevant control variable [46].

Total Revenue - based on the same arguments as for using this variable in the regression model for equity value, the thesis group suggests that this is a relevant control variable.

Total Assets - the book value of a company's total assets on the last day of the fiscal year. This control variable accounts for differences in capital structure that are size related and whom may affect ROA.

Cash Reserves - the amount of liquid assets by the end of the fiscal year. Under the dynamic trade-off theory [9], cash holdings could influence how firms adjust their capital structure over time. Companies with higher cash reserves can rely more on internal financing. This could eventually reduce the urgency to issue debt and enable more gradual convergence toward their target leverage.

3.5 Validation of results

Calculations will be done in Stata, a program widely used for econometric calculations and also by Wooldridge [36] in his literature. There are many methods available in Stata for checking the robustness of your regression model. One central thing to look for is whether the t-test and corresponding P-value for the main independent variable, which in the case of this thesis is debt-to-equity ratio. The t-value tests if a coefficient is not close to zero, thus a large absolute value of t is desired. The p-value reveals the possibility of the t-test via normal distribution. It explains the smallest value that the significance level could reject the null hypothesis. A value below the 5% significance level will be acceptable for this thesis, if nothing else is stated, and is a common significance limit among researchers. Would the t-test and p-value show that the main dependent variable is not significant you are left with two alternatives, either trying another regression model with different control variables or draw the conclusion that the model

does not show evidence of your hypothesis. The R^2 value tells you how much of the variation in the dependent variable that is explained by the regression model. In other words, a high value means that the model is better representing how the variables change within companies through the years. In terms of panel data regressions there are two R^2 values, one for analyzing the variation within the panels and the other for analyzing the variance between the panels. For example, an R^2 value of 0.25 within panels means that 25% of the variation of one company's values within the given period is described by the model [36].

The error standard deviations σ_u and σ_e can help us understand the source from the variation, that is if it is based on fixed effects or random noise. A significantly larger σ_u than σ_e is a sign of that a fixed effects model is the right choice. Another method for trying out whether fixed effects or random effects suits best is the Hausman test, a test that investigates the correlation between company fixed effects and the independent variables. If the assumption is made that eα_i are uncorrelated with all X_{it}, then the random effects method is appropriate. But if the α_i are correlated with some explanatory variables, then a fixed effects model is needed [36].

An additional regression will be conducted for each of the four cases that investigates how the relationship between debt-to-equity ratio and the dependent variable looks like in the absence of the control variables.

4 Empirical results

4.1 Results of equity value regression analysis during recession

Table 3: Regression results retrieved from Stata. Analysis of equity value and debt-to-equity ratio during recession. A * indicates significance to the 5% level or lower.

in_average_EV	**Coefficient**	**std. err.**	**t**
DER_win	-0.2060714*	0.0865632	-2.38
ROA_win	0.0324266*	0.0093502	3.47
Asset_turnover_win	0.066493	0.1637225	0.41
Tangible_assets_win	0.0000583	0.0000485	1.20
TOTAL_Revenue_win	0.0000198	0.0000165	1.20
Beta_win	0.2364285*	0.1122647	2.11
Liquidity_win	0.0000274	0.0001016	0.27
DIVIDENDS_win	0.0001184	0.000017	0.70
_cons	6.5855801*	0.299367	22.00
Number of companies		72	
R^2 within panels		0.1062	
σ_u		1.791975	
σ_e		0.51921881	

During the recession period between 2008-2012, 72 companies had necessary data available to conduct the analysis viewed in Table 3. The significant coefficient of debt-to-equity shows that companies equity value is affected negatively by increasing their debt-to-equity ratio. The coefficient of debt-to-equity β_1 in equation (4) imply that a change in debt-to-equity by one unit decreases the equity value by approximately 18.6% due to the dependent variable being logarithmic. This value is calculated using the following formula:

$$\text{Percentage change} = (\text{e}^{coefficient} - 1) * 100 \tag{12}$$

4.1.1 Validation of result and choice of regression model

Table 4: Results from Hausman test in Stata

Hausman test	**Values**
chi^2	56.25
Prob > chi^2	0.0000

The Hausman test performed in Stata indicated that the fixed effects model is the right way to approach. Since the probability of chi^2 being larger than 56.25 is below 0.05, it is likely that α_i is correlated to one or several of the dependent variables in the regression, referencing to Table 4. Moreover, it can be viewed in Table 3 that σ_u is 3.5 times larger than σ_e which strengthens the claim that fixed effects is an appropriate assumption.

Table 5: Regression results with only dependent variable

	Coefficient	Std. err.	t
DER_win	-0.2313671*	0.0866484	-2.67
_cons	7.297264*	0.0692344	105.40
R^2 within panels	0.0242		

The regression for equity value without control variables during the recession still show a significant result, referencing to Table 5. The coefficient shows a result of -0.2313671 which implies that one unit increase in debt-to-equity ratio will decrease equity value by approximately 20.66% according to equation (12).

4.2 Results of equity value regression analysis during expansion

Table 6: Regression results retrieved from Stata. Analysis of debt-to-equity ratio and equity value during expansion. A * indicates significance to the 5% level or lower

in_average_EV	**Coefficient**	**std. err.**	**t**
DER_win	-1.5953*	0.2566882	-6.21
ROA_win	-0.381611*	0.0113493	-3.36
Asset_turnover_win	0.5587808*	0.2697568	2.07
Tangible_assets_win	-0.0000872	0.0001507	-0.58
Total_revenue_win	0.0000831	0.000632	1.31
Beta_win	0.8488239*	0.1145319	7.41
Liquidity_win	0.0004331	0.0003779	1.15
Dividends_win	-0.0000339	0.0007673	-0.04
_cons	5.321142*	0.5351376	9.94
Number of companies		130	
R^2 within panels		0.2373	
σ_u		2.4524894	
σ_e		1.3376507	

This result includes 130 companies with 519 observations in total during the expansion period from 2015-2018. Table 6 shows that the debt-to-equity variable has a significantly negative effect on equity value. In accordance with β_1 in equation (4) the effect of one unit increase in debt-to-equity is interpreted with a logarithmic dependent variable and will therefore decrease the equity value by 79.75%. This value is calculated using equiation (12).

4.2.1 Validation of result and choice of regression model

Table 7: Results from Hausman test in Stata

Hausman test	**Values**
chi^2	97.12
Prob > chi^2	0.0000

The Hausman test performed in Stata indicated that the fixed effects model is the right way to approach. Since the probability of chi^2 being larger than 97.12 is below 0.05, it is likely that α_i is correlated to one or several of the dependent variables in the regression, referencing to Table 7. Moreover, it can be viewed in Table 6 that σ_u is 1.84 times larger than σ_e which strengthens the claim that fixed effects is an appropriate assumption.

Table 8: Regression results with only dependent variable

	Coefficient	Std. err.	t
DER_win	-1.656942*	0.283392	-6.17
_cons	7.254508*	0.1526561	47.52
R^2 within panels	0.0895		

The regression for for equity value without control variables during expansion show a significant result. The coefficient shows a result of -1.656942 seen in Table 8, which indicates that one unit increase of debt-to-equity ratio will decrease equity value by approximately 80.93% according to equation (12).

4.3 Results of ROA regression analysis during recession

Table 9: Regression results from retrieved from Stata. Analysis of debt-to-equity ratio and ROA during recession. A * indicates significance to the 5% level or lower

ROA	**Coefficient**	**std. err.**	**t**
ROA_lag	-0.0060135	0.0423945	-0.14
DE_lag	0.0159155*	0.0046905	3.39
ln_EBIT	3.175931*	0.390126	8.14
ln_TotalRevenue	-1.570039	0.9981296	-1.57
ln_TotalAssets	-0.6341595	0.8105075	-0.78
Cash	-0.0020969	0.0018216	-1.16
_cons	6.961138	3.737688	1.86
Number of companies		88	
R^2 within panels		0.5434	
σ_u		3.0379956	
σ_e		1.3204357	

88 of the studied companies' had sufficient data available in the database during the economic recession between 2008 and 2012, viewed in Table 9. The panel data regression showed significant results on how debt-to-equity ratio affects these companies ROA during the period. Referring to equation (10), β_1 showed to be 0.01592 which implies that a one unit increase in debt-to-equity ratio increases ROA with 1.592% the next year. In other words, if a company with a debt-to-equity ratio of 1 and ROA of 10% doubles their leverage, which is a massive move, it would increase ROA to 11.592%.

4.3.1 Validation of result and choice of regression model

Table 10: Results from Hausman test in Stata

Hausman test	**Values**
chi^2	62.76
Prob > chi^2	0.0000

The Hausman test performed in Stata indicated that the fixed effects model is the right way to approach. Since the probability of chi^2 being larger than 62.76 is below 0.05, it is likely that α_i is correlated to one or several of the dependent variables in the regression, referencing to Table

10. Moreover, it can be viewed in Table 9 that σ_u is three times larger than σ_e which strengthens the claim that fixed effects is an appropriate assumption.

Table 11: Regression results with only dependent variable

	Coefficient	Std. err.	t
DER_win	0.0146804	0.0138683	1.06
_cons	0.09156	0.4362146	0.21
R^2 within panels	0.0127		

The regression for ROA without control variables during recession shows coefficient of -0.0146804, referencing to Table 11. The effect of a one unit increase of debt-to-equity ratio would decrease ROA by approximately 1.47%. However, the result is not statistically significant at the 5% limit.

4.4 Results of ROA regression analysis during expansion

Table 12: Regression results retrieved from Stata. Analysis of debt-to-equity ratio and ROA during expansion. A * indicates significance to the 5% level or lower

ROA	**Coefficient**	**std. err.**	**t**
ROA_lag	0.0296041	0.0340442	0.87
DE_lag	0.0083489*	0.0040029	2.09
ln_EBIT	3.734564*	0.2713617	13.76
ln_TotalRevenue	2.526236*	0.6052305	4.17
ln_TotalAssets	-2.407019*	0.5145234	-4.68
Cash	-0.0033986	0.0110141	-0.31
_cons	-3.129897	2.353427	-1.33
Number of companies		118	
R^2 within panels		0.5701	
σ_u		2.5385343	
σ_e		1.094175	

118 of the studied companies' had sufficient data available in the database during the economic recession between 2015 and 2018, as viewed in Table 12. The panel data regression showed significant results on how debt-to-equity ratio affects these companies ROA during the period. Referring to equation (10), β_1 showed to be 0.00835 which implies that a one unit increase in debt-to-equity ratio increases ROA with 0.835% the next year. In other words, if a company with a debt-to-equity ratio of 1 and ROA of 10% doubles their leverage, which again is a massive move, it would increase ROA to 10.835%.

4.4.1 Validation of result and choice of regression model

Table 13: Results from Hausman test in Stata

Hausman test	**Values**
chi^2	13.16
Prob > chi^2	0.0405

The Hausman test performed in Stata indicated that the fixed effects model is the right approach. Since the probability of chi^2 being larger than 13.16 is below 0.05, it is likely that α_i is correlated to one or several of the dependent variables in the regression, referencing to Table 13. Moreover, it can be viewed in Table 12 that σ_u is 2.5 times larger than σ_e which strengthens the claim that fixed effects is an appropriate assumption.

Table 14: Regression results with only dependent variable

	Coefficient	Std. err.	t
DER_win	-0.0044495	0.0068177	-0.65
_cons	-0.96274	0.3854395	-2.50
R^2 within panels	0.0008		

The regression for ROA without control variables during expansion shows a coefficient of -0.0044495, referencing to Table 14. The effect of a one unit increase of debt-to-equity ratio would decrease ROA by approximately 0.45%. However, the result is not statistically significant at the 5% limit.

5 Discussion and analysis

This chapter provides an in-depth interpretation and analysis of the empirical results presented in the previous section. The findings are examined in relation to the theoretical framework and prior research to understand how companies have adjusted their capital structure in response to varying economic conditions. Particular attention is given to how these adjustments have influenced key performance indicators such as ROA and equity value. In addition, the chapter reflects on the study's delimitations and discusses how these limitations may have influenced the interpretation and reliability of the regression results.

5.1 Results discussion

5.1.1 Discussion of ROA regressions

Comparing the results of this thesis and the research papers mentioned previously, it is clear that there is no general effect on ROA to expect when adjusting debt-to-equity ratio. This regression model showed to explain the relationship between the variables very well for both economic phases, with R^2 being 0.54 for the recession regression and 0.57 for the expansion regression respectively. Other then that the results were significant to either the 5% or 1% level, showcasing even further that the result well explains how adjustments in debt-to-equity affects companies in Sweden during the periods 2008-2012 and 2015-2018. However, many of the found research papers that have conducted similar studies in other industries and countries show different correlations between ROA and debt-to-equity. Salim & Ydav [17] showed that among Malaysian listed companies between the years 1995-2011 there is a negative effect on ROA with increased leverage. The industries of Industrial Product and Consumer Product, which can be assumed to contain similar companies as the manufacturing industry in Sweden, showed the strongest effect. In other words, their study showed a strong negative correlation between debt and ROA which does not align for similar companies in Sweden. On the contrary, Brank & Hadley [16] revealed that American companies, with or without a CEO with recession experience, see the same relationship between debt and ROA during recessions as the results of this study does. In general, American companies between 1992-2015 decrease debt during recessions, which has a negative effect on ROA. Companies with a CEO that has experience of recessions increases debt and this increases ROA. These two alternatives of managing debt during recessions in America illustrates a positive correlation with debt and ROA, which is also the type of correlation that occurred between the same variables for Swedish listed manufacturing companies during the recession of 2008-2012, suggesting that what the regression analysis shows could be correct. A conclusion cannot rely entirely on these comparisons due to the other studies being done on a broader range of companies than that of this thesis and for a wider time

period as well. Above all it is three different countries that experience different macroeconomic effects and does not necessarily experience the same economic phases.

Several regressions have been conducted, both with and without control variables. For ROA, the regressions without any control variables was not statistically significant. However, even though this result, the model with control variables showed a greater R^2 which implies that the variance that is dependent by fixed effect is better described by the model including control variables.

5.1.2 Discussion of equity value regressions

One unit increase of debt-to-equity is associated with approximately 18.6% decrease in the company's average equity value if all else is constant. This negative relationship between equity value and debt-to-equity ratio may, according to the findings by [**?**], suggest that investors will penalize companies due to concerns about increase financial risk especially when leverage increases beyond a tolerable level. With this result being statistically significant, taking on more debt during the recession period can be viewed negatively by the market. The regression on equity value for the expansion period is similar as the one for recession in terms of a negative correlation. However, during the expansion period, debt-to-equity ratio had a greater effect on equity value than during the recession period. The effect on equity value with a one unit increase in debt-to-equity ratio equals -79.75%. This result suggests that companies from the sample, on average, have a negative effect on equity value when increasing their debt-to-equity ratio. Likewise for the recession period, but in a smaller extent.

The findings are consistent with the dynamic trade-off theory since it captures differences in the effect on equity value during the two economic phases. It can be argued that this change in the effect of debt-to-equity ratio on equity value, from this thesis results, is due to a shift in the economic conditions which in turn shift the optimal capital structure, described from the dynamic trade-off theory. However, it is not certain that this shift in economic conditions is the only factor responsible for the magnitude of the change in effects on equity value. The dynamic trade-off theory suggests that a firms optimal capital structure for firm value changes depending on the surrounding environment. The existence of this said optimal capital structure should mean that if a company below that point increases their leverage, the value of the firm would increase. A company beyond the optimal capital structure would instead suffer in terms of firm value from an increase in leverage. The results from this thesis could mean that Swedish listed manufacturing companies overall had a lower debt-to-equity ratio than the optimal prior to both economic cycles. The sole effect that the recession and expansion had on the companies might have been overshadowed by the industries general lack of debt, given the statements of the dynamic trade-off theory.

Danis et al. [10] provide an explanation of the dynamic relationship between profitability and leverage. When comparing their findings to the results of this thesis, which suggest a positive relationship between ROA and the debt-to-equity ratio, it indicates that the companies included in this study are generally operating close to, or perhaps at, their optimal capital structure [10]. However, it is important to consider how this interpretation aligns with the notable shift observed in the impact of debt-to-equity ratio on equity value across different economic phases. According to the trade-off theory [8], the relationship between leverage, debt-to-equity and firm value is conceptualized as an inverted U-shape, implying that as a firm approaches its optimal level of debt, the marginal effect of additional leverage on firm value should diminish. Nevertheless, this theoretical expectation does not appear to be fully supported by the findings of this study, which once again supports the fact that the dynamic trade-off better fits the behavior of the real world. While the effect of leverage on equity value is estimated to be close to eight times larger during the expansion period compared to the recession period. Interestingly, ROA continues to exhibit a positive association with leverage for Swedish listed manufacturing companies, which contradicts the results of Danis et al. [10]. Perhaps the different time period is the core to the difference which indicates once again that macroeconomic factors of different time periods is contributing. After all, there is evidence that macroeconomic factors such as consumer price index, producer price index and GDP affects the profitability of firms [34]. Although the effect on ROA is estimated to be nearly half the size during the expansion compared to the recession, the positive direction of the relationship persists, suggesting the need for further investigation into how robust these theoretical predictions are under varying macroeconomic conditions [10].

In contrast to the findings of Salim and Yadav [17], who investigated Malaysian companies during the period 1995–2011, the results from this research present a notable divergence. Specifically, a negative relationship between the debt-to-equity ratio and equity value was observed, whereas Salim and Yadav reported a positive relationship between total debts to assets ratio and Tobin's Q. Although Tobin's Q is not an identical metric to equity value, the two are closely related, given that the formulation of Tobin's Q (1) explicitly incorporates the market value of equity. However, drawing precise conclusions about the direct relationship between Tobin's Q and pure equity value is inherently complex, as the ratio is influenced by the interplay of total debt and total assets. While debt and total assets often increase proportionally on a one-to-one basis, this is not universally the case according to accounting principals. For instance, events such as share buybacks or corporate losses can affect the debt-to-assets ratio, sometimes by altering total debt or equity more significantly than total assets [11].

To isolate the specific impact of total debts to assets on only equity value, it would be necessary to hold total assets and total debts constant in the equation (1), thereby removing confounding

effects. Nonetheless, one robust observation emerges from this study: an increase in the debt-to-equity ratio is consistently interpreted negatively by the the firm's shareholders. This stands in contrast to the findings of Salim and Yadav[17], where increases in total debt to total assets were associated with higher valuation multiples, indicating a market reward for higher leverage.

Research by Hirdinis [35] aligns with the claims of Uzliawati [19] and shows a positive relationship between debt-to-equity ratio and price to book value by investigating 47 Indonesian companies in the mining sector. However in relation to this thesis results they collide, which could be a result of several factors, with the main ones being macroeconomic effects that differs between different industries, countries, time periods, and investor preferences [22].

An alternative explanation to the negative effect of debt-to-equity on equity value in this study and the increase in this effect during the expansion period is suggested by both Amromin et al. [12][22], which provide evidence on how investor preferences changes during distinct economic phases. In conclusion, both the research papers are in agreement that the general investor tends to be behave more optimistic, which leads to companies being over valued during expansion periods compared to being more risk averse and pessimistic during recessions. The expectations of economic stability by the investors during the expansion period might have an effect of the results of this thesis.

The regressions for equity value was also conducted with and without control variables. By analyzing these results, both models showed a statistically significant result. However, the models including control variables, resulted in a greater R^2. This implies that the variance that is dependent by fixed effect is better described by the models including control variables.

5.2 Critical reflection of delimitations

The study's delimitations have enhanced manageability of the research and given a clear focus on the studied sample. However, the two delimitations, Swedish listed manufacturing companies and the time periods 2008-2012 and 2015-2018, introduce some constraints that are worth discussing.

Recessions and expansions usually have different characteristics and impacts. By only analyzing one of each and not several, it is likely that results from the analyzed periods may not represent other recessions and expansions. The case may also be that other recessions and expansions affect different industries than the analyzed period. The underlying cause for only examining two periods has to do with the choice of data and research question. Not only in capital IQ, but in other databases as well, where data on Swedish manufacturing companies are lacking further

back in time. In the chosen database there where only a few companies who fit the criteria that had been listed through multiple economic phases. The thesis group made the judgment that an analysis with such few companies would not have shown any reliable results.

The dataset only focus on manufacturing companies which implies that all companies from the service sector are excluded. Swedens GDP consists of approximately 65% from the service sector [28]. These companies may be affected differently from the manufacturing firms. By not analyzing this sector, there will be a risk of overlooking branch specific dynamics that potentially could affect capital structure adaptations during different states of the economy. This may not be a shortcoming to answer the research question, but instead an area of improvement for future studies.

The analysis has only considered companies that were listed during the research periods. This has resulted in a fairly limited amount of observations which could have an affect on the robustness and statistical significance of the analysis. By excluding companies that were not public during the research period, there is a risk of unintentional survivorship bias. This suggests that the data set will be slightly skewed towards companies that were financially stable and remained listed during both or one of the periods.

6 Conclusion

The results of this report can contribute to increased understanding for financial strategies during changes in the macroeconomic environment and give relevant insights that could be valuable for company managers, investors and policymakers. All of whom are stakeholders that operate in the industry's unpredictable and uncertain economic landscape. An additional goal with this result is to enhance adaptations of capital structure and lay ground for better decision-making within the Swedish manufacturing companies.

The research was carried out to thoroughly examine how Swedish listed manufacturing companies adaptations of the debt-to-equity ratio has affected return on assets and equity value. The two metrics were used to measure financial performance during different states of the economy during the periods 2008 to 2012 and 2015 to 2018. Four panel data regressions with fixed effects have been conducted in Stata.

When the Swedish economy is in a recession changes in debt-to-equity ratio for listed manufacturing companies has a negative correlation with equity value while it has a positive correlation with ROA. When the economy is in a expansion that relationship remains but the magnitude of the impacts is different between the economic cycles. Equity value was more affected by debt-to-equity ratio during an expansion than it was during a recession while ROA was more effected by debt-to-equity ratio during the recession.

The results are not supported by the null hypothesis since the regressions for ROA and equity value during both economic phases showed a significant result. The results for both ROA regressions showed a positive effect of an increase in debt-to-equity value which implies that they are supported by H1 and H2. For equity value, both regressions showed a negative effect of an increase in debt-to-equity which implies that they are not supported by H3 and H4.

What stakeholders of this study could learn from the results is that there are significant relationships between debt-to-equity ratio and ROA as well as equity value between 2008-2012 and 2015-2018. However, it is not certain that the results are representative for all recession and expansions. Similar studies in different countries and industries indicate inconsistent results on the effect of adjustments in debt-to-equity ratio, suggesting that macroeconomic factors plays a big part. There is probably not a correct way to manage a companies capital structure only depending on if the economy is currently in a recession or expansion. Instead, the current macroeconomic environment has an extensive impact and needs to be studied as well.

6.1 Future research

Future research could benefit from incorporating a broader sample by including companies that entered or exited the market during the research periods. This would not only increase the number of observations, but also provide a more comprehensive understanding of how companies adapt their capital structures in response to changes in the economic environment. Moreover, an increased amount of observations would also enhance statistical robustness which in turn could lead to more significant results. Since the topic tangents on decision making, it would be a good idea to gather information through interviews and case studies.

An interesting development of this research would be too look at different change rates in GDP and not at periods where it is classified as recession or expansion. With the definitions brought by KI for this thesis, which is illustrated in Figure 1, periods where the Swedish GDP has been +/- 5% from usual growth rate are studied. However, it is clear from viewing the picture that there could be a strong increase in GDP even though the economy is classified as a recession for example. This scenario is illustrated by the area labeled as D in Figure 1 and the same can be said about a decrease in GDP during expansions. Perhaps the effect debt-to-equity ratio had on ROA was very low during both time periods due to ROA being neutralized, given the assumption that ROA increases when the population make more purchases. In order to investigate this the same study could be conducted but for periods that consists of the same derivative of GDP growth regardless the classification of economic phases.

Appendix

Below is a list of all Swedish listed manufacturing companies that have been studied. These are the companies that the screening from Capital IQ resulted in.

AAC Clyde Space AB (publ) (OM:AAC)
AB SKF (publ) (OM:SKF B)
AB Volvo (publ) (OM:VOLV B)
ABB Ltd (SWX:ABBN)
Absolent Air Care Group AB (publ) (OM:ABSO)
Absolicon Solar Collector AB (NGM:ABSL B)
Acuvi AB (OM:ACUVI)
Addtech AB (publ.) (OM:ADDT B)
Aerowash AB (publ) (NGM:AERW B)
Afry AB (OM:AFRY)
AGES Industri AB (publ) (OM:AGES B)
Agtira AB (OM:AGTIRA B)
Alfa Laval AB (publ) (OM:ALFA)
Alimak Group AB (publ) (OM:ALIG)
Alleima AB (publ) (OM:ALLEI)
Alligo AB (publ) (OM:ALLIGO B)
Amnode AB (publ) (NGM:AMNO)
AQ Group AB (publ) (OM:AQ)
Arise AB (publ) (OM:ARISE)
ASSA ABLOY AB (publ) (OM:ASSA B)
Atlas Copco AB (publ) (OM:ATCO A)
Avsalt Group AB (NGM:AVSALT)
AVTECH Sweden AB (publ) (OM:AVT B)
Balco Group AB (OM:BALCO)
BE Group AB (publ) (OM:BEGR)
Beijer Alma AB (publ) (OM:BEIA B)
Beijer Ref AB (publ) (OM:BEIJ B)
Bergman & Beving AB (publ) (OM:BERG B)
Berner Industrier AB (OM:BERNER B)
Billerud AB (publ) (OM:BILL)
Bioextrax AB (publ) (OM:BIOEX)
BoMill AB (publ) (OM:BOMILL)
BPC Instruments AB (NGM:BPCINS)
Bravida Holding AB (publ) (OM:BRAV)

Bufab AB (publ) (OM:BUFAB)
Byggmästare Anders J Ahlström Holding AB (publ) (OM:AJA B)
ByggPartner Gruppen AB (publ) (OM:BYGGP)
Cell Impact AB (publ) (OM:CI)
Climeon AB (publ) (OM:CLIME B)
Concejo AB (publ) (OM:CNCJO B)
CTEK AB (publ) (OM:CTEK)
CTT Systems AB (publ) (OM:CTT)
Danaher Corporation (NYSE:DHR)
Doxa AB (publ) (OM:DOXA)
Drillcon AB (publ) (OM:DRIL)
Duroc AB (publ) (OM:DURC B)
Eagle Filters Group Oyj (HLSE:EAGLE)
EasyFill AB (publ.) (NGM:EASY B)
EatGood Sweden AB (Publ) (NGM:EATG)
Ecoclime Group AB (publ) (OM:ECC B)
Ecomb AB (publ) (NGM:ECOMB)
EcoRub AB (publ) (NGM:ECO B)
Electrolux Professional AB (publ) (OM:EPRO B)
Eltel AB (publ) (OM:ELTEL)
engcon AB (publ) (OM:ENGCON B)
Enrad AB (NGM:ENRAD)
Ensurge Micropower ASA (OB:ENSU)
Envirologic AB (publ) (NGM:ENVI B)
Eolus Vind AB (publ) (OM:EOLU B)
Epiroc AB (publ) (OM:EPI A)
ES Energy Save Holding AB (publ) (OM:ESGR B)
Fagerhult Group AB (OM:FAG)
Fasadgruppen Group AB (publ) (OM:FG)
Ferroamp AB (publ) (OM:FERRO)
Ferronordic AB (publ) (OM:FNM)
Finepart Sweden AB (publ) (NGM:FINE)
FlexQube AB (publ) (OM:FLEXQ)
FM Mattsson AB (publ) (OM:FMM B)
Freemelt Holding AB (publ) (OM:FREEM)
Garo Aktiebolag (publ) (OM:GARO)
Garpco Aktiebolag (publ) (NGM:GARPCO B)
GomSpace Group AB (publ) (OM:GOMX)
Gosol Energy Group AB (NGM:GOSOL)

Green Landscaping Group AB (publ) (OM:GREEN)
Guideline Geo AB (publ) (OM:GGEO)
HAKI Safety AB (publ) (OM:HAKI B)
Hanza AB (publ) (OM:HANZA)
Heliospectra AB (publ) (OM:HELIO)
Hexagon AB (publ) (OM:HEXA B)
Hexatronic Group AB (publ) (OM:HTRO)
Hexicon AB (publ) (OM:HEXI)
HEXPOL AB (publ) (OM:HPOL B)
Hifab Group AB (publ) (OM:HIFA B)
Husqvarna AB (publ) (OM:HUSQ B)
Hybricon AB (publ) (NGM:HYCO)
Idun Industrier AB (publ) (OM:IDUN B)
Image Systems AB (OM:IS)
Impact Coatings AB (publ) (OM:IMPC)
Indutrade AB (publ) (OM:INDT)
Inission AB (publ) (OM:INISS B)
Instalco AB (publ) (OM:INSTAL)
Invisio AB (publ) (OM:IVSO)
Inwido AB (publ) (OM:INWI)
ITAB Shop Concept AB (publ) (OM:ITAB)
JM AB (publ) (OM:JM)
K-Fast Holding AB (publ) (OM:KFAST B)
Kakel Max AB (publ) (OM:KAKEL)
KB Components AB (publ) (OM:KBC)
KebNi AB (publ) (OM:KEBNI B)
Kongsberg Automotive ASA (OB:KOA)
Lagercrantz Group AB (publ) (OM:LAGR B)
Lifco AB (publ) (OM:LIFCO B)
LightAir AB (publ) (NGM:LAIR)
Lightning Group AB (NGM:LIGR)
Lindab International AB (publ) (OM:LIAB)
Lyckegård Group AB (publ) (OM:LYGRD)
Malmbergs Elektriska AB (publ) (OM:MEAB B)
Metacon AB (publ) (OM:META)
Midsummer AB (publ) (OM:MIDS)
MilDef Group AB (publ) (OM:MILDEF)
Minesto AB (publ) (OM:MINEST)
Momentum Group AB (publ) (OM:MMGR B)

Munters Group AB (publ) (OM:MTRS)
Mycronic AB (publ) (OM:MYCR)
NCC AB (publ) (OM:NCC B)
Nederman Holding AB (publ) (OM:NMAN)
Netel Holding AB (publ) (OM:NETEL)
NFO Drives AB (publ) (NGM:NFO)
NIBE Industrier AB (publ) (OM:NIBE B)
Niutech Group AB (NGM:NIUTEC)
Nolato AB (publ) (OM:NOLA B)
Nordic Flanges Group AB (publ) (OM:NFGAB)
Nordisk Bergteknik AB (publ) (OM:NORB B)
Norditek Group AB (publ) (OM:NOTEK)
Nyab AB (publ) (OM:NYAB)
OEM International AB (publ) (OM:OEM B)
OptiCept Technologies AB (publ) (OM:OPTI)
OXE Marine AB (publ) (OM:OXE)
Peab AB (publ) (OM:PEAB B)
Plejd AB (publ) (NGM:PLEJD)
PowerCell Sweden AB (publ) (OM:PCELL)
Precomp Solutions AB (publ) (OM:PCOM B)
Projektengagemang Sweden AB (publ) (OM:PENG B)
Qben Infra AB (publ) (OM:QBEN)
QleanAir AB (publ) (OM:QAIR)
Railcare Group AB (publ) (OM:RAIL)
Rederiaktiebolaget Gotland (publ) (OM:GOTL A)
Reinhold Europe AB (publ) (WSE:RHD)
Rejlers AB (publ) (OM:REJL B)
Saab AB (publ) (OM:SAAB B)
Safe at Sea AB (publ) (NGM:SAFE)
SaltX Technology Holding AB (publ) (OM:SALT B)
Sandvik AB (publ) (OM:SAND)
Sarsys AB (NGM:SARS)
Saxlund Group AB (publ) (OM:SAXG)
Scandinavian Astor Group AB (publ) (DB:Y73)
Seafire AB (publ) (OM:SEAF)
SeaTwirl AB (publ) (OM:STW)
SEHED Byggmästargruppen AB (publ) (NGM:SEHED B)
Sibek AB (publ) (OM:SIBEK)
SinterCast AB (publ) (OM:SINT)

Skanska AB (publ) (OM:SKA B)
SolTech Energy Sweden AB (publ) (OM:SOLT)
SSAB AB (publ) (OM:SSAB A)
Stockwik Förvaltning AB (publ) (OM:STWK)
Storskogen Group AB (publ) (OM:STOR B)
Studsvik AB (publ) (OM:SVIK)
Sustainable Energy Solutions Sweden Holding AB (publ) (NGM:SENS)
Svedbergs Group AB (publ) (OM:SVED B)
Sweco AB (publ) (OM:SWEC B)
Systemair AB (publ) (OM:SYSR)
Teqnion AB (publ) (OM:TEQ)
TopRight Nordic AB (publ) (NGM:TOPR)
Train Alliance AB (publ) (OM:TRAIN B)
Trelleborg AB (publ) (OM:TREL B)
Troax Group AB (publ) (OM:TROAX)
VBG Group AB (publ) (OM:VBG B)
W5 Solutions AB (publ) (OM:W5)
Wästbygg Gruppen AB (publ) (OM:WBGR B)
Westinghouse Air Brake Technologies Corporation (NYSE:WAB)
Worley Limited (ASX:WOR)
XANO Industri AB (publ) (OM:XANO B)
Zenergy AB (publ) (DB:8T40)

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