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# The Impact of a Negative Repo Rate on Corporate Financing Decisions: the Swedish case

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# ABSTRACT

## Background

In 2014, the Riksbank adopted a zero interest rate policy (ZIRP), and in 2015 a negative interest rate policy (NIRP). This unparalleled situation, with an extremely low rate has sparked a heated debate amongst economists as well as laymen. Notably, there is a growing concern that the low interest rates may cause bubbles in industries where price levels are not really captured by the CPI. Moreover, there is a lack of research on how these low interest rates affect corporate financing decisions and economic sustainability. The research on how capital structures is affected by the repo rate is only in its infancy.

## Aim

This thesis aims to investigate how the Riksbank's monetary policy during the last five years has affected companies' financial strategies, regarding debt and capital structure, and risk-taking. In particular, the study will look at how practitioners at investment banks and investment firms and academics reason regarding the effects of ZIRP and NIRP. The thesis also encompasses an analysis of the current monetary policy's impact on economic sustainability.

## Methodology

The thesis is an explorative study and the methodology is primarily qualitative. It is based on semi structured interviews with investment bankers, investment managers and academics. These interviews are then complemented with secondary data on repo rates, firm solvency and more. The analysis is abductive in that it moves between the perspectives of the interviewees, the data and theory.

## Literature review

Monetary policy, its effects on market interest rates and yield requirements are discussed first. Furthermore, the dominant theories on capital structure are covered: trade-off theory and pecking order theory. Next, the most common types of private debt are discussed. The review ends with an introduction to economic sustainability and financial bubbles.

## Conclusion

The study gives support to the assumption that ZIRP and NIRP has in fact affected corporate financing decisions, regarding capital structure and debt composition. Firm size is hypothesised to be a moderator of the relationship between capital structure and repo rate. Moreover, the interviews conducted for this thesis support several of the hypotheses put forth in the Master's thesis of Severin and Rademark (2006). For instance, interest rate is a major factor to consider when taking on debt. By diminishing the cost of debt and increasing corporate risk-taking, ZIRP and NIRP have contributed to an increase in systemic risk. Being an explorative study, the conclusion is presented in the form of eight new hypotheses.

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# ACKNOWLEDGEMENTS

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# WORD LIST

**Boom -** A boom refers to a period where certain stocks or product prices spiral upwards in an uncontrollable fashion. During a boom, output and market investments are increased. (Investopedia, n.d.a).

**Consumer Price Index (CPI) -** Consumer price index is a price measurement for an amount of services and goods in a country which can be used when estimating the inflation in the country (Financial Times, n.d).

**Covenant** - Covenant relates to an agreement of demands set by the creditor to a debtor. This is made to protect the creditor from financial repercussions by making the debtor fulfil certain conditions or prohibit certain actions. If the covenant is broken, the loan may for instance be declared default, or penalties could be applied. The demands are often set revolving KPIs and a sustainable business model which the debtor should practice (Investopedia, n.d.b).

**Deflation** - In contrary to inflation, deflation decreases money supply, which in turn leads to an increased value of the currency (Investopedia, n.d.c).

**EBITDA -** This KPI stands for: Earnings Before Interests, Tax, Depreciation and Amortization. It is commonly used to indicate the company's ability to service debt. Often used in combination with a multiple to valuate a company before acquisition (Investopedia, n.d.d).

**External investors** - In this thesis, external investors include: angel investors, venture capitals, private equity firms and institutional investors or corporate investors. The difference between these investors range from exit strategies, amount of capital and maturity of the company being funded. The resulting difference is first and foremost the involvement each investor presents.

**Finansinspektionen (FI)** - Finansinspektionen, also known as FI, is an authority in Sweden whose duty is to supervise and support the efficiency and stability of the financial system (FI, n.d).

**Investment Firms** - A company with the main objective to buy and sell shares in companies. Through their ownership, they develop these companies over time. The size of companies referred to as investment firms ranges from small venture capital firms to publicly traded “control companies”.

**IPO -** An initial public offering (IPO) is a first-time sale of a company’s stock on the public stock market. When going public, every individual, institution or investor will have the opportunity to invest in the company. Thus, the company will be obligated to have a portion of its shares available for purchase to the public, regularly it is a third of the shares that are being sold on the financial market (Welch, 2009).

**Key Performance Indicators (KPI)** - These are sets of measurable variables which contains information on the performance of the company. The most common KPIs revolve around profit margin and revenue (Investopedia, n.d.e).

**LBO** - A leveraged buyout (LBO) is when the acquisition of a company is mainly financed with debt. LBO is a method to acquire a company without having a great amount of equity. The method is often used when acquiring small or medium firms, or divisions of larger enterprises (Gaughan, 2007).

**MBO –** A management buyout (MBO) is a type of leverage buyout. It is a business purchasing strategy that professional managers could execute to become the new owners of a company instead of employees. The professional managers simply do a buyout of a specific activity/division within a company which have potential for becoming an entirely separate business (Gaughan, 2007).

**M&A** - M&A is a collective term for merges and acquisitions, hence the name M&A. A merge can be defined as two companies allowing an integration in-between them, a so-called fusion or merge. An acquisition is however when a company is purchased by another company, i.e. acquired (Welch, 2009).

**ROI** - Return of Investment, is a performance measure which rates the investment contrary other possible paths of investments. ROI is used to consider profit against the capital invested (Investopedia, n.d.f).

**R&D -** R&D, also known as research and development, is way of producing knowledge within companies and a strategy for growth (Gaughan, 2007).

**Solvency -** This measurement is used to gain information of given companies’ ability to meet long-term financial obligations (Investopedia, n.d.g).

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# 1 INTRODUCTION

The Swedish central bank, *the Riksbank*, was founded in 1668 (Riksbanken, n.d.a). This makes it the first and oldest central bank in the world, after which several other countries quickly modelled their own central banks. The founding of the Riksbank marked the beginning of a now centuries old debate concerning the role of central banks in the economy and society at large.

By the Riksbank's account, the primary purpose as a central bank is to maintain price stability in the country by using the *repo rate* to influence the rate of inflation (Riksbanken, n.d.b). Manipulating the repo rate affects the money supply into the financial system, which is intimately linked to price levels, and thus inflation. Another important and very much related function the Riksbank occupies, is that it has the sole responsibility for manufacturing and providing the market with currency.

Nonetheless, there are diverging views on what the role of a central bank should be. Concern for the dangers of inflation has varied greatly over time amongst scholars and public intellectuals. It is quite plausible this difference of opinion on inflation, that lies at the root of many[1] of the disagreements around central banking.

The concern for inflation partly stems from its relation to unemployment, as evidence emerged in the 1950s that there is a negative correlation between inflation and unemployment (Fregert and Jonung, 2014). This relation is known as the *Phillip's Curve*[2], and displays the trade-off between those factors. According to the view among central bankers and monetary economists, a rise in unemployment leads to a fall in inflation, which cannot be explained by price adjustment (Mankiw, 2011). However, some contemporaries of Phillips, such as Nobel laureate Milton Friedman, argued that it is only in the short run monetary policy affects this relation, and that in the long run there is no real correlation between inflation and unemployment (Ball, 2009). He would further argue in a Hayekian fashion, that a high inflation rate distorts the economy and ultimately hinders economic growth. However, many economists today argue that a too low rate of inflation also can be detrimental to economic growth. Therefore, many central banks, including the Riksbank, have set up an inflation target, usually around 2%. This inflation rate is considered to be the sweet spot between the two extremes.

From 2012 and onwards, the rate of inflation in Sweden has been well below the Riksbank's target rate of 2%, at times even negative (Statistics Sweden, n.d.a). This is indicative of a deflationary climate. The Riksbank has therefore been pushed to pursue a monetary policy with unprecedented rates, by applying a negative repo rate. This unparalleled situation, combined with a low inflation rate, has sparked a heated debate amongst economists as well as laypeople.

1 But is clearly not the only factor. Several other perspectives are appropriate in understanding the debate on monetary policy: Public Choice; libertarian versus more statist ideologies; behavioral economics etc.

2 Named after economist William Phillips who reported much of the historical data showing the relationship.

Notably, there is a growing concern that this low repo rate may cause bubbles in industries where price levels are not really captured by the *Consumer Price Index* (*CPI*)[3]. It is argued, for instance, that the low rate pushes house prices upwards along with household leverage, resulting in a fragile and a not-so-sustainable situation (Riksbanken, 2016).

However, the zero and negative interest rate policies, also called *ZIRP* and *NIRP*, have in some cases resulted in significant benefits for companies (Fransson and Tysklind, 2016). For instance, financing M&A activities, investing in R&D and issuing IPOs, is more easily pursued and very favourable because of the current monetary policy. Moreover, as economist Paul Diggle points out, Sweden has had more growth in the banking sector than the rest of the eurozone despite, or perhaps because of, the negative repo rate (2016).

All this has led to a distinguished interest in analysing how companies' willingness to borrow, take on risk and invest are affected by the negative repo rate. This concern is not surprising, considering that many economists view the adequate functioning of companies' investment patterns, and risk-taking, the primary engines of a well-functioning economy (Goetzmann et al, 2015). One important aspect to analyse, is how the monetary policy has affected the balance between the two basic methods applied when funding M&A activities and investments: taking on debt or issuing equity (i.e. stocks). In other words, how has the capital structure been influenced by ZIRP and NIRP?

Almlöf, Hafdell and Fröding (2016) studied this question quantitatively for the period up until 2014. They investigated the relationship between capital structure and the Swedish repo rate. They encouraged other researchers to extend upon their work by:

- increasing the scope and looking at smaller companies;
- perform a qualitative study to understand how practitioners reason about interest rates, and the Riksbank's repo rate.

By the same token, Severin and Rademark (2006) studied how Chief Financial Officers reason about capital structure. The authors postulate that the major theories on capital structure do not explain the actual reasoning of practitioners. Their Master's thesis concludes with a set of hypotheses about capital structure for future researchers to explore.

## 1.1 Aim

This thesis aims to investigate how the Riksbanks's monetary policy during the last five years has affected companies' financial strategies, regarding debt and capital structure, and risk-taking. In particular, the study will look at how practitioners at investment banks and investment firms and academics reason regarding the effects of ZIRP and NIRP. The thesis also encompasses an analysis of the current monetary policy's impact on economic sustainability.

3 This is further elaborated in section *3.1.1. CPI as a determinant of monetary policy*.

By consulting the available research literature on the topic and conducting interviews with parties with experience in financial markets, the ambition is to present a nuanced and measured picture of the low repo rate's effect on companies' investments. Theory, as well as the attitudes and thoughts of relevant investment bankers and investment managers, will be considered and compared. Hopefully, this study will contribute to a new understanding of what impact ZIRP and NIRP has had on the financial world; voicing a new way forward in the current debate on monetary policy.

The present thesis aims to expand upon the Bachelor's thesis of Almlöf, Hafdell and Fröding's (2016) by taking a qualitative approach. Furthermore, since the study has a more exploratory character, it studies not only capital structure, but also debt composition and economic sustainability. Moreover, the thesis also builds on the hypotheses on capital structure put forth by Severin and Rademark (2006).

The conclusion of the report will be a set of hypotheses, for other researchers to further investigate. Two research questions will guide the formulation of these hypotheses, which will be presented in the following section.

## 1.2 Research questions

As described above, this thesis sets out to answer the following question: How has the Riksbank's monetary policy over the last five years affected Swedish companies' attitude and investment strategies? This specific scope was chosen due to the change in repo rate from positive to negative.

Furthermore, the main objective has been broken down into two research questions:

i. How have companies' financing decisions been affected by ZIRP and NIRP?
    a. Is there a credit expansion?
    b. What has happened to debt composition?
    c. What has happened to capital structure?
    d. How does practitioners' reasoning fit with theory?
ii. How has the low repo rate affected economic sustainability?
    a. Is the Swedish monetary policy expansionary?
    b. Does Sweden really have a low repo rate?
    c. Is the inflation target valid?
    d. Is NIRP sustainable?

## 1.3 Delimitation

The study has been limited by a few factors, due to the sheer scope of information on the topic and the complexity of the issue. The study is limited by:

- Time frame: past 10 years.

- Geographic location: Sweden.
- Study objects: mainly investment banks, investment firms and listed companies (instead of e.g. individuals).
- Choice of interview objects: practitioners at investment banks, investment firms and academics.
- Choice and quantity of research literature covered: primarily limited by project time allocated to reading.
- Structure and quantity of interviews: primarily limited by project time.

The potential drawbacks of these delimitations are many and some obvious. The benefits are on the other hand immense, as these delimitations makes a thorough analysis of the issue at hand possible. Rather than covering a too wide of an area, rigor and depth is pursued.

Furthermore, the object of the study is limited by geographic location, considering first and foremost the country of Sweden.

The choice of literature was determined by the research questions, as well as by guidance from experts in the field. The quantity of readings was limited by the time allocated in the project for research.

## 1.4 Report outline

To address the aim, the study has been divided into seven chapters.

- Chapter 1: An introduction to the subject of the thesis.
- Chapter 2: The research methodology: interview study and literature study and the underlying reasoning for these.
- Chapter 3: A review of the literature necessary for understanding the effects of monetary policy on corporate financing. The chapter deals with monetary policy, optimal capital structure, debt composition and economic sustainability.
- Chapter 4: A brief historical overview of key measures over the last 10 years and a summary of the results of the interview study.
- Chapter 5: The results are analysed and different perspectives contrasted to each other and discussed in light of the literature review. The result of this analysis is a series of hypotheses.
- Chapter 6: A wider discussion on the effects of the current situation.
- Chapter 7: Lastly, there is an ending conclusion.

# 2 METHOD

In the social sciences, there is a tendency for research designs to move from an exploratory, to a descriptive, to a causal design (Wallen, 1996). There is a straightforward rationale for this shift: when an area of investigation is young, there are many unknown complexities. Attempts at causal explanations, like those made in the natural sciences, are futile. Often, it is not even clear what the relevant questions to ask are. The exploratory design of this study is therefore well supported.

The report is based on interviews with representatives from investment banks, investment firms and academics supplemented by a literature study. The literature study was used to guide the construction, conduction and interpretation of the interviews.

The choice of method is partly inspired by Genelov et al (2015), whose Bachelor's thesis ended up as a merging of a literature study and an interview study, analysing the effects of automation. In contrast to their work, the focal point of this study is on the interview study rather than the literature study.

## 2.1 Literature study

The study began by surveying a selection of available literature on central banks in general. Moving forward, focus shifted to Sweden. The purpose was to learn what the contemporary views on central banking are, and specifically how these views apply to the Swedish situation.

The study drew from methodologies used in software engineering by having two-week literature sprints[4]. The choice of literature included both books and research articles. When longer books were chosen, they were read over more than one sprint. By consulting researchers in fields relevant to monetary policy, finding quality sources took less work. Furthermore, by choosing literature based on specific questions, a narrower set of articles and books were obtained.

## 2.2 Empirical study

Empirics was gathered primarily via interviews, as a cost-effective way of learning about the underlying thoughts of individuals. This is an especially suitable means of investigation when the goal is to acquire a deeper understanding of an issue (Blomkvist and Hallin, 2015, p. 76). Furthermore, interviews make stumbling upon new research ideas or good modifications of the current one more likely. Quantitative data (e.g. data on companies' capital structure) complemented the interviews and were used to analyse the veracity of practitioners' responses.

[4] Primarily popularised by the introduction of the popular Scrum methodology in recent years.

### 2.2.1 Interview study

The interviews were semi structured, providing the benefits of high reusability between interviews whilst still preserving a degree of flexibility. Whenever possible, interviews were recorded and summarised but no manual transcription was made. Moreover, the interviews were conducted in pairs, which enabled one person to guide the conversation whilst the other one was taking notes.

Severin and Rademark (2006) interviewed Chief Financial Officers (CFO) to analyse their reasoning on capital structure and how "practice fits with theory". By interviewing practitioners in investment banks and investment firms, this study builds upon their hypotheses.

The rationale for interviewing investment banks is threefold:

1. Investment banks advise companies in their investment decisions. By interviewing some of the major Swedish investment banks, this study indirectly gauges the sentiment of many companies;
2. Moreover, they are quite likely to influence investments in terms of capital structure, debt composition and economic sustainability;
3. The repo rate has a direct effect on banks' interest rates (see chapter 3). These interest rates, in turn, affect company borrowing.

The rationale for interviewing investment firms is threefold:

1. Investment firms' primary focus is investments. By interviewing investment firms, it is possible to identify what drives investment decisions.
2. They can give a response to how the reallocation of capital is affecting the economy;
3. Like banks, they are in direct contact with many companies (e.g. their own portfolio companies). The same type of arguments as for banks hold.

Also, eight academics were emailed and asked for an interview, but five of them declined. Thus, three academics have been interviewed to give their perspective on ZIRP and NIRP, and the economic sustainability of these.

**Selection criteria of bank interview objects:**

- Work at a major Swedish investment bank;
- Work directly with M&As, IPOs and/or risk management;
- Have most clients within industrial companies or PE-firms;
- Experience from working in financial and capital markets.

**Selection criteria of investment firm interview objects:**

- Work at a major Swedish investment firm;
- Work directly with M&As, IPOs and/or risk management;
- Diverse set of portfolio companies (companies in at least three different sectors).

Below is the full list of people interviewed during the study:

*Chart 2.1: List of interviewed objects. A summary of the participants and their relevance in this study is presented in Appendix A. The questions used in the interviews can be found in Appendix B-E.*

| Individual | Position | Reason for inclusion |
|---|---|---|
| Maxine Rior | at Danske Bank | Bank perspective |
| Erik Mårtensson | at Danske Bank | Bank perspective |
| Wiveca Swarting | at Danske Bank | Bank perspective |
| Kristoffer Svensson | at Nordea | Bank perspective |
| Adam Lidén | at Nordea | Bank perspective |
| Rickard Talling | at Swedbank | Bank perspective |
| Alpha (anonymous)[5] | Investment firm A | Investment firm perspective |
| Bravo (anonymous)[5] | Investment firm B | Investment firm perspective |
| Charlie (anonymous)[5] | Investment firm C | Investment firm perspective |
| Taylan Mavruk | Researcher at Gothenburg University | Academic perspective |
| Christian Sandström | Researcher at Chalmers University | Academic perspective |
| Jan Jörnmark | Economic historian | Academic perspective |

### 2.2.2 Secondary data

Secondary data from financial reports, bookkeeping and annual reports has been gathered. Solvency data for companies listed on the NASDAQ Stockholm as well as First North was collected via Börsdata.se. The average of solvency was calculated for each year. Solvency data for a total of 498 companies was gathered. These were compiled into a spreadsheet from which solvency averages were computed. See Appendix H through K for the complete dataset.

Inflation rates, monetary supply, repo rate and measures of bank lending were gathered from Statistics Sweden and the Riksbank.

**Calculations**

The weighted average of repo rate for each year since 2006 was calculated (see appendix G). This enabled the *linear correlation* between solvency and repo rate for the last 10 years to be calculated. The purposes of calculating the correlations were:

- to complement the graphs of solvency versus repo rate. By checking the correlation, it is easier not to be misled by the graphs;
- to expand upon the Bachelor's thesis of Almlöf, Hafdell and Fröding (2016) who did a correlational study capital structure and repo rate.

However, the sample size in this study is small and the correlations should not be viewed as robust. Moreover, there is no obvious reason for why the relationship should be linear.

The formula for *Pearson's r*, which is a common correlation coefficient, was used when calculating the correlation (Ahlgren, Jarneving and Rousseau, 2003). The MATLAB command *corrcoef* was used to calculate the correlations.

[5] Why the investment managers choose to be anonymous is presented in Appendix A.

## 2.3 Discussion about validity

The opinions of the interviewees are not necessarily representative of the broader banker and investment firm population. Therefore, our findings are not automatically generalisable. This is the rationale for writing the conclusion in the form of a set of hypotheses.

Moreover, no interviews were made with personnel at non-financial institutions apart from the interviewees at the investment firms. For instance, how CFOs reason about the repo rate's effect on capital structure could differ from how investment bankers reason. This study tries to address this gap, by discussing the findings in the context of previous research. For instance, previous researchers have interviewed CFOs about capital structure (Severin and Rademark, 2006). Their findings are discussed in the analysis section and compared to the findings of this study.

There is also a risk that the interviewees have interpreted questions differently. Economic sustainability, for example, does not a have a clear-cut definition. Thus, there is some risk that differences in viewpoint between the interviewees are a result of them *"answering different questions"*, rather than them having real differences of opinion.

Given the human tendency for biased thinking, it is very likely that individual accounts of what is happening to the economy are more shaped by cognitive heuristics, such as representativeness and availability, rather than on a strict assessment of data (see e.g. Kahneman, 2003). Considering the topic at hand is highly uncertain and politicised, one can expect cognitive biases to be especially pronounced. This includes the biases of the authors themselves. On the other hand, perhaps this qualitative approach is needed in an early phase, to enable other researchers to navigate these seemingly uncharted waters, and eventually perform more quantitative and data driven research. To avoid the pitfalls of these biases, all authors of this study have been involved in all parts of the thesis. This way, the authors' viewpoint diversity worked as a counterbalance to the menace of confirmation bias[6].

This concludes the review of the methods used to compile this thesis. Next, chapter *3 Literature review* surveys the theories that form the basis of understanding for interpreting the results of the interviews and calculations.

[6] Confirmation bias is the tendency for people to interpret information in ways confirming their own beliefs.

# 3 LITERATURE REVIEW

In this chapter, the literature relevant to this study's research questions is reviewed. Theory on monetary policy, capital structure and debt composition is covered. Also, research on economic sustainability and financial bubbles is presented. The chapter ends with an introduction to the literature used to interpret the gathered data in chapter *5 Analysis*. The following sub-chapters are included:

- Monetary policy and its consequences;
- Optimal capital structure;
- Debt composition;
- Economic sustainability;
- Other literature.

## 3.1 Monetary policy and its consequences

The Riksbank aims to maintain price stability by influencing the money supply. This is called monetary policy and affects the *inflation rate* in order to reach the inflation target. The inflation target in Sweden is set to 2% (Riksbanken, n.d.b). The repo rate is the Riksbank's primary instrument for affecting inflation rate. The interest rate is applied to banks when borrowing from the Riksbank, or depositing capital (see figure 3.1). Expectations of, and de facto changes of the repo rate, drive market rates (Riksbanken, n.d.c).

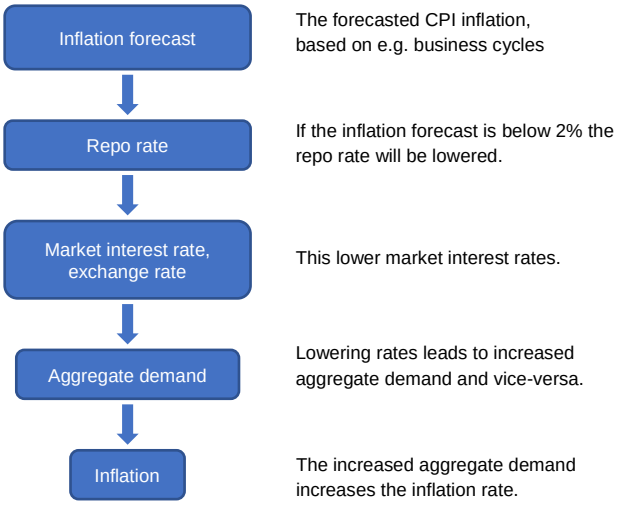


*Figure 3.1: Schematic diagram of monetary policy. It is a stylised case when the inflation forecast is below the target of 2% (Fregert and Jonung, 2014) Reworked based on Fregert and Jonung. Author's own copyright.*

The degree of expected change of repo rate shifts aggregate demand. Important to note is that a change in monetary policy has a delay of one to two years before effects on market interest rates become visible (Riksbanken, n.d.c). This is a significant reason why monetary policy is

based on forecasts concerning growth and inflation. A paper from Uppsala University called *Why has inflation deviated from target? A Swedish Phillips Curve* by Johan Grip (2014) even goes so far as to say that the intended effects of lowering interest rates could be delayed up to eight years. This drawn-out delay is due to the construction of the private loan market in Sweden. The paper also states that in the immediate and short term, the inflation rate goes down because of lowered interest rates.

Another method to influence money supply is *quantitative easing*. This method is first and foremost used when the possibility to lower the repo rate is no longer an option. When central banks utilise quantitative easing, they increase the supply of money by purchasing government bonds (Investopedia, n.d.h).

The Swedish economist Knut Wicksell (1936) argued that business cycles are a result of deviations from the *natural rate of interest*. Wicksell defines the *natural rate of interest* as an interest level compatible with a stable price level. In short, he argues that a monetary policy that keeps interest rates above the natural rate contracts the economic activity and leads to lower prices. The opposite effect is consequently obtained when the interest rate is below the natural rate.

### 3.1.1 CPI as a determinant of monetary policy

Changes in Consumer Price Index (CPI) is a common measure of inflation in Sweden. It measures changes in price level of a so-called "*basket of consumer goods and services*" The purpose of CPI is to indicate changes in household costs. Therefore, CPI is an important variable when considering the Riksbank's monetary policy. However, since price increases of individual parts may skewer CPI, there is a need to estimate the *underlying* inflation. This is done by excluding price shifts on individual goods in CPI. One such measure is CPIF - which stands for CPI with fixed interest rates (Riksbanken, n.d.d).

CPI inflation depends on exchange rates and international prices, i.e. international capital flow. Hence, these are important to consider when deciding upon monetary policy. A rapid growth in value of the Swedish currency, the Krona, dampens import prices and decreases demand of Swedish goods, which results in a decrease in exports. Moreover, an increase in international prices contributes to a rising inflation in Sweden (Casas, 1977).

### 3.1.2 Repo rate's effect on market interest rates

Banks' profitability depends partly on the margin between their own interest rates and the Riksbank's lending rate. Therefore, as banks seek to maximise their profits, the Riksbank's repo rate has a direct effect on banks' lending rates.

Stockholm Interbank Offered Rate (STIBOR) is the average of rates the so called STIBOR-banks[7] offer each other. STIBOR is used as a reference rate for banks when determining their

[7] All the major Swedish banks.

interest rates to companies (Riksbanken, n.d.e). Consequently, STIBOR is an influential factor to consider when trying to understand how companies and their choice between different types of funding are affected by the repo rate (see figure 3.2).


*Figure 3.2: The transmission mechanism from repo rate to market rates. Author's own copyright.*

### 3.1.3 Repo rate's effect on required yield

*Capital Asset Pricing Model*, or *CAPM*, is one of the most common methods used to estimate the required yield on equity. It can also be used to calculate the required yield of a certain investment (Öhrlings PricewaterhouseCoopers, 2007). The required yield on equity depends on the *risk-free interest rate* and *market risk premium*, both in turn depending on the repo rate. The risk-free rate is the expected return on a default-free, hence risk-free, investment, and is usually based on a 5- or 10-year government bond's yield to maturity. Hence, the repo rate affects the risk-free rate and by proxy the required yield.

The professional services firm Öhrlings PricewaterhousCoopers (PWC) annually conducts a study about the market risk premium and the risk-free rate on the Swedish stock market (Walberg, J, 2017). The aim of the study is to regularly measure the perception of the market risk premium. When the latest findings were published, the premium was at a record level, as the study started in 1998. Regarding the risk-free rate, the data in chart 3.1 suggests that, in Sweden, the use of either the 5- or 10-year government bonds as a reference are most common.

*Chart 3.1: Most preferred method to estimate the risk-free rate in Sweden between 2013 and 2017. Source: Walberg, J, 2017.*

| Rate | March 2013 | March 2014 | March 2015 | March 2016 | March 2017 |
|---|---|---|---|---|---|
| 10-year bond | 54% | 69% | 66% | 55% | 62% |
| 5-year bond | 10% | 19% | 17% | 13% | 11% |
| Other rate | 26% | 13% | 17% | 32% | 27% |

### 3.1.4 ZIRP and NIRP

In Keynesian Economics, there is a phenomenon known as a "*liquidity trap*" (Krugman, 2000). It is characterised as a situation when a central bank lowers its interest rates all the way down to zero, without really affecting investing, consumption or price levels. In this scenario, a central bank has lowered its interest rates all the way down to zero. Instead of spending or investing, consumers and companies start saving. Hence, the liquidity trap creates a situation where monetary policy becomes ineffective.

In 2014, the Riksbank introduced a *zero-interest rate policy (ZIRP)* and was effectively in a liquidity trap (Spence, 2015). However, in 2015 the Riksbank went one step further and defied,

one could argue, the logic of the liquidity trap. They did what many previously would have thought impossible: introduced a *negative interest rate policy* (NIRP) (Riksbanken, n.d.f; Spence, 2015). They brought it down below zero in order to increase inflation, aiming for the 2% target. The new policy implicated that depositing money at the central bank imposed a cost. With rates in the negative, savers do not attain any return on their money deposited in banks. Therefore, consumers and companies become incentivised to take on more credit to consume and invest. In theory, the new incentive structures should lead to a hefty credit expansion.

### 3.1.5 Hypothesised effects on solvency

Fregert and Jonung, 2014 argue that a boom period in combination with low interest rates could increase *solvency*[8]. They suggest that low interest rates in a boom period are likely to increase borrowing. Moreover, asset prices increase at a higher rate than CPI. According to Fregert and Jonung (2014), this leads to equity increasing faster in value than total assets. They argue that this is due to extensive leverage. Hence, in boom times when borrowing is high, solvency increases. This would contradict the logic that solvency declines when borrowing is high. In the next chapter *3.2 Optimal capital structure*, this question regarding solvency will be further discussed and additional views presented.

## 3.2 Optimal capital structure

There are two main types of capital related to financing projects or investments: debt and equity (Marks et al., 2009). Debt is a credit liability, whilst equity is the value of an ownership interest in the company, i.e. stocks. A firm's capital structure is defined as the amount of the firm's debt and equity, including the debt and equity used to fund its capital and operating investments. There are many several types of debt and equity used in corporate financing. However, as this report's focus is mainly on how the repo rate affects the choice of capital structure, only the most common types of debt will be discussed.

### 3.2.1 Equity

As equity represents shareholders' ownership in a company, the shareholders are entitled to an equivalent share in any profit (Downes and Goodman, 2014). In a start-up firm, the initial capital needed is usually supplied by the entrepreneur, but in most cases the firm will sooner or later be in the need of more capital. Then there are several possible sources from which to seek funding (Berk and DeMarzo, 2016).

To raise outside equity capital, firms can seek capital from *external investors* or from the public stock exchange. A company deciding to sell part of its stocks, i.e. equity, publicly on the stock exchange for the first time, transacts an *initial public offering*, *IPO* (Berk, and DeMarzo, 2016).

[8] A company's solvency is equity value divided by the value of all assets. It is one way of characterizing capital structure.

The main purpose with an IPO is to access capital. Going public offers access to more capital than from individual investors. Also, it increases the exposure of the company and its business.

### 3.2.2 Why use debt as leverage?

Leverage can be defined as *"The process of increasing risk and potential return on an asset through borrowing."* (Kay, 2016). Companies' main incentive for using debt to finance investments is that leverage can multiply the return on invested capital. When allocated successfully, it can generate remarkable revenues at low cost (Krefetz, 1986). Leverage is not risk-free, but the risk is usually considered worthwhile, simply because the more capital invested, the greater the potential return. Another significant advantage of increasing the debt-to-equity ratio, i.e. use leverage, is that it gives the company's owners the opportunity to maintain their equity in the firm (Kay, 2016).

Optimising a company's capital structure can be a complex process. Evaluating the risk of default in repaying debt, plus the interest rate, and balance it with the availability of equity, is an essential part (Marks et al., 2009). Many factors need to be considered in each situation, e.g. the stage of the company and industry dynamics. In general, a start-up would go for equity, in the absence of assets and cashflow, whilst a well-established company would usually prefer debt financing (Hamburg Coplan, 2016). However, these assumptions vary, depending on financial circumstances and the creditors willingness to lend money.

To summarize, the capital structure depends on many factors. Within this report mainly interest rate will be the considered and evaluated factor. The following sections *3.2.3*, *3.2.4* and *3.2.5* present the major theories on how firms choose their capital structure.

### 3.2.3 Modigliani-Miller Theorem

Nobel laureates Franco Modigliani and Merton Miller (1958) showed that, in perfect capital markets, capital structure is irrelevant for market value as well as for *Weighted Average Cost of Capital* (WACC). This is the classic model on capital structure and is known as the *Modigliani-Miller Theorem*. When adding taxes to the model, however, increased debt means tax savings (Frank and Goyal, 2007). Consequently, managers generate greater returns to shareholders if they increase the debt-to-equity ratio. In this case, maximising firm value, is done by increasing debt to a 100%. The authors move on to discuss how other market imperfections would affect the model.

In practice, capital markets and corporate environments are much more complex than the M&M-model accounts for. However, the M&M theory of capital structure laid the groundwork for much of the future study of capital structure (Frank and Goyal, 2007). For instance, what could offset the effects of taxes? The *Trade-off theory* grew out of this debate and will be discussed next.

### 3.2.4 Trade-off theory

The trade-off theory of capital structure starts with the assumption that there are both costs and benefits associated with debt (Frank and Goyal, 2007). In other words, here lies the proverbial trade-off. According to the theorem, an optimal capital structure is found when these costs are balanced against the benefits (see figure 3.3).

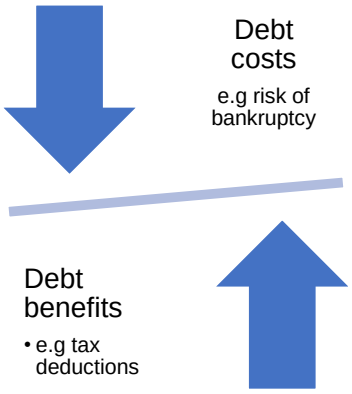


*Figure 3.3: Trade-off theory – debt benefits and costs. Author's own copyright.*

A classic version of this theory is the so-called *static theory of optimal capital structure.* It claims that companies balance the risk of default against the tax savings debt provides. Therefore, companies benefit from combining debt and equity when funding their investments. This generates greater returns to shareholders, compared to returns from an all-equity firm (Marks et al., 2009).

Too much leverage might lead to business failure when things do not go as planned, and a too careful strategy with not enough capital to invest may result in missed market opportunities. Also, excessive cost of capital may decrease the company's appeal to investors and shareholders.

### 3.2.5 Pecking order theory

Another contrasting theory of capital structure is the *Pecking-order theory* (Frank and Goyal, 2007). This theory states that companies do not aim at a targeted capital structure. Instead, they choose funding in a *pecking order* (see figure 3.4). Companies, according to this theory, prefer to finance new projects with internal funding, such as retained earnings. If this is not an option, the company moves on to debt funding. The last and most undesirable option is financing through equity issuance.


*Figure 3.4: Pecking order theory. Funding preference order. Author's own copyright.*

There are several ways to derive this pecking order. One way to derive a pecking order is to assume the exitance of an information asymmetry between managers and shareholders. Managers are said to have more information about the company than outside actors (Chen and Chen, 2011). It is argued that companies signal economic strength when using own capital for funding new investments. However, if external financing is required, the theory emphasises that companies first and foremost use bank loans before other types of funding, i.e. equity. Equity issuance is particularly sensitive, since it would not be issued if the stock was undervalued[9]. Equity issuance would signal to the shareholders that the stock is overvalued, which leads to a drop in stock price. All in all, this is the result of information asymmetry, and leads to the company foregoing the equity option. According to the pecking order theory, the pecking order is expected to be more pronounced when information asymmetries are larger (Ni and Yu, 2008). Smaller companies would be one such instance.

There are several operationalisations of capital structure. In this thesis, capital structure will be operationalised as firm solvency (see equation 1 for definition).

*Equation 1*

$$Solvency = \frac{Book\ value\ of\ equity}{Total\ assets}$$

## 3.3 Debt composition

Debt issued to finance corporate investments can be divided into two separate categories: private and publicly traded debt (Marks et al., 2009). The categories have different priority: *subordinated* or *unsubordinated*. Private debt is usually a bank loan and public debt often bonds.

### 3.3.1 Common types of private debt

When a company seeks to fund an investment, they should consider which kind of debt is most suitable for the given situation. Different types of debt have different risks and priority. The most common types of debt are presented in chart 3.2.

[9] In more technical terms, this is known as *adverse selection*. High quality companies are not selected for because of information asymmetry. For the classic and instructive "lemons" example see (Akerlof,1970).

*Chart 3.2: Different types of debt. Author's own copyright.*

| Type of debt | Explanation |
|---|---|
| **Senior debt** | Senior debt is of highest priority. Most loans issued by a bank to companies are of senior kind. In case of a default, this debt is paid back first. Therefore, there is low risk for the creditor. The interest rate is low and thus also yield. (E. Mårtensson, personal communication, 2 March, 2017) |
| **Junior debt** | Junior debt has lower priority than senior debt, i.e. in case of default, junior debt is paid back to the creditor after senior debt. Lower priority implies more risk for the creditor, who, consequently, demands a higher interest for the loan. (E. Mårtensson, personal communication, 2 March, 2017) |
| **Mezzanine debt** | Mezzanine is a hybrid of debt and equity. In the case of default, the debt is converted to equity. Mezzanine is of lower priority than junior debt. Mezzanine investors' increased risk is balanced with higher interest rate (Marks et al., 2009; Crawford, 1987). |
| **Payment in kind loan, PIK** | Like mezzanine debt, a PIK loan is a combination of debt and equity. However, for the PIK loan, the interest rate increases as the lender's creditworthiness decreases (Kay, 2016; Investopedia, n.d.i). It has a onetime pay-out at maturity, and this sum includes accumulated interest rate on the taken loan. |

The figure below presents the risk and potential return associated with the different types of private debt as well as equity. In case of default, *senior debt* is the first debt to be paid back, and equity holders are the last to be paid back. Hence, the risk of not getting paid is increasing the further to the right the debt is placed. Higher risk consequently results in higher interest on the loan for the debtor. This leads to a form of pecking order (see figure 3.5).

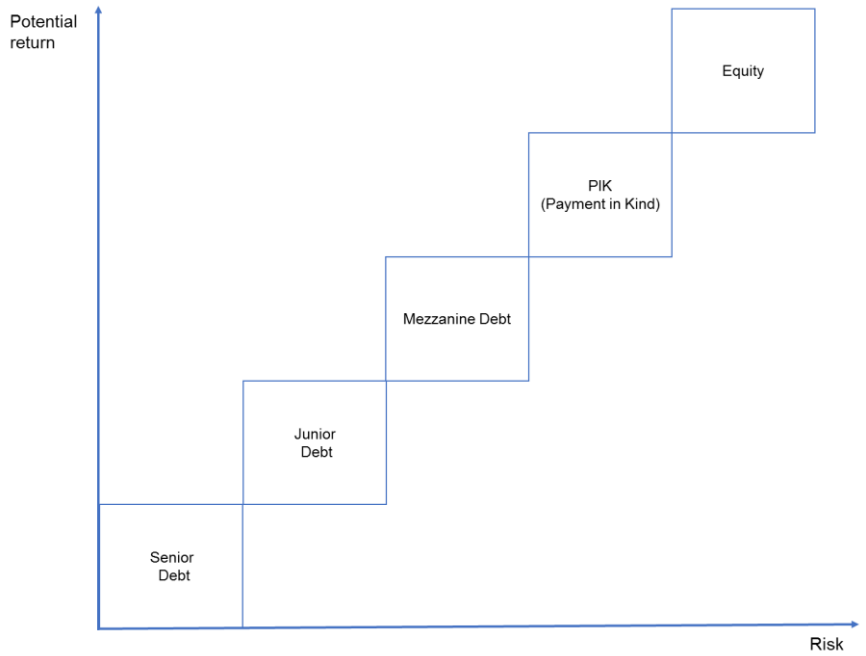


*Figure 3.5: A schematic description of the relation between diverse types of debt. The x-axis, risk, represents how creditors are prioritised in case the debtor defaults. The y-axis, potential return, describes the possible revenue for the creditor, or investor, and cost for the debtor. It was created based on the literature in combination with information gathered from the bank interviews. Author's own copyright.*

### 3.3.2 Corporate bonds

Corporate bonds are issued by a company to finance some kind of investment. Corporate bonds is an alternative to bank loans and equity. The term bond usually refers to a debt with maturity of at least one year. Bonds can be divided into two distinct categories (Berk and DeMarzo, 2016):

- investment grade – bonds with low default rate and subsequently low interest.
- high yield – bonds characterised by higher risk of default and therefore a higher interest rate.

With corporate bonds, companies can diversify their financing (Bonthron, 2014). Crucially, corporate bonds make companies less dependent on bank loans. The strict *covenants* of bank loans make them less flexible than bonds. Low interest climates push investors to seek their return in high-yield bonds, instead of in investment grade bonds.

### 3.3.3 Bond market vs stock market

Capital always seeks yield. Where it can find yield varies depending on interest rates. As discussed above, expansionary monetary policy and low interest rates encourages borrowing and spending, as opposed to saving. The opposite is true in a high interest rate environment (Millard, 2016). High interest rates attract more investors to the bond market, and low interest rates makes stocks more desirable (Forbes, 2016).

There exists an *inverse relationship* between interest rates and bond prices, i.e. when interest rates increase, bond prices decrease, and vice versa (Wells Fargo, n.d) So, when interest rates rise, and hence the yield, bonds become more attractive. This since the price decreases, and one can receive higher yield than obtained from stocks (Barclays Bank, 2017). Low interest rates stimulate the "investment appetite", money becomes cheap and spending therefore increases (Millard, 2016). When interest rates are low, the bond yield is low, as explained. However, low interest rates benefit the stock markets as more money can be invested, resulting in increasing demand, which in turn drives up asset prices. As a result, stocks become more attractive than bonds in this type of expansionary monetary environment (see figure 3.6).

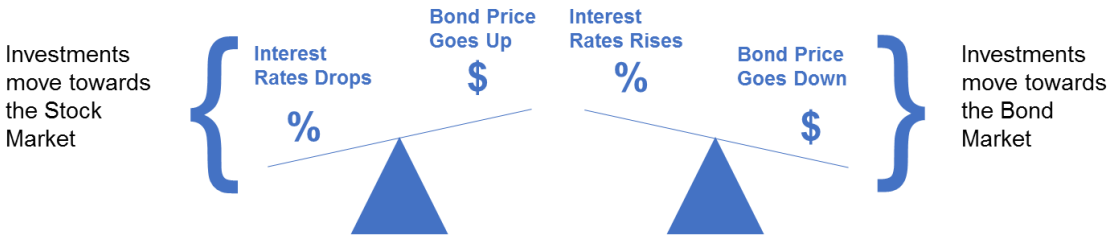


*Figure 3.6: Relation between interest rates and bond prices. Author's own copyright.*

## 3.4 Economic sustainability

Sustainability can be divided into three sub-concepts: Social-, Environmental- and Economic Sustainability (Hansmann et al, 2012). These three overlap and interact. Financial crises, for instance, can have considerable social implications (Otker-Robe and Podpiera, 2013). This was regarded as one of the primary reasons for the bailouts during the financial crisis 07/08 (Collins, 2015, July 14).

Economic sustainability is not a well-defined concept (Doane and MacGillivray, 2001). Several different definitions have been proposed. The following two are relevant for this study:

- "*Economic growth can and should occur without damaging the social fabric of a community or harming the environment"*
- *"Maintaining high and stable levels of economic growth is one of the key objectives of sustainable development. Abandoning economic growth is not an option. But sustainable development is more than just economic growth. The quality of growth matters as well as the quantity."*

Going forward, economic sustainability will refer to "*Maintaining high and stable levels of economic growth".*

### 3.4.1 Interest rates and (un)sustainability

There is a concern that if the repo rate is *not* kept low, it will impede growth. However, the opposing concern is that ZIRP and NIRP increases the risk for bubbles and potentially a new financial crisis. Dell'Ariccia et al. (2016) note in their report on the financial crisis of 07/08 and monetary policy that *"Some hold the view that interest rates were held too low for too long in the run up to the crisis, and that this helped fuel an asset price boom, spurring financial intermediaries to increase leverage and take on excessive risks".*

**Soaring asset prices and bubbles**

One driver of bubbles is a belief that the product prices of today will be higher tomorrow (West, 1986). When this belief is widespread, investors race to invest without reflecting on the fundamental value of the product or asset. For instance, the oldest recorded case of a bubble is the "tulip mania" in 1647, during which some tulips reached the price $30,000 (O'Hara, 2008). The fundamental value of the tulips was not driving price formation, but rather the expectations of further price increases. Shortly thereafter, the bubble burst.

Some argue that the low interest rates during the period leading up to the financial crisis 07/08 was a cause of the rising asset prices (Dell'Ariccia et al., 2016). In a similar vein, many economists are worried that Sweden's low interest rates are driving up asset prices and creating a housing bubble (for a discussion see e.g. Dermani et al., 2016; Giordani et al, 2015).

The Riksbank is also concerned about asset bubbles (Dillén and Sellin, 2003). They could use contractionary monetary policies to combat them. By increasing the repo rate, they could lower

the demand for money and thus also lower inflationary pressures. However, the current inflation target of the Riksbank is in terms of consumer price index, as mentioned above. Therefore, during times of low CPI inflation and high asset inflation, the Riksbank is likely to pursue an expansionary monetary policy. Bryan at. al (2001) argues that it is therefore reasonable to include asset price in the price index, which the Riksbank use as a central target variable.

Wicksell's theories (1936) about monetary policy also relates to bubbles. He argues that if the interest rates do not match the *natural rate of interest*, this could stimulate excessive growth through a credit expansion. This growth could potentially create an endogenous credit cycle with financial bubbles as result. When these credit bubbles burst, they turn the economy into a recession, or even depression. To quote Wicksell himself:

"*... an upward movement of prices acts undoubtedly as a stimulus to the spirit of enterprise...for it is only too often associated with unhealthy speculation, based on what is a boom on paper rather than in actual economic fact, and culminates in over-expansion of credit, credit disturbances, and crisis.*" (p.2)

**Systemic risk**

When a financial institute or company is so fundamental for the economy at large, that their default could create significant instability in the economy, there exists a *systemic risk* (Systemic risk, n.d.). This is a risk to the economy as a whole, and not just the individual company. When a bubble forms, it creates a systemic risk in that when the bubble burst, it can have far reaching negative consequences. Perhaps the aforementioned tulip mania in the 1600s did not affect that many people, but the bubbles of today do (Kaufman, 2000).

When companies or institutions pose a significant systemic risk, they are often labelled "too big to fail". That means the government will step in and make sure they do not default. The financial crisis of 07/08 was a case of systemic risk, where the government stepped in and made sure some key companies did not default.

The European Central Bank, ECB, conducted a study of the American case after the financial crisis of 2008: *Bank leverage and monetary policy's risk-taking channel: evidence from the United States* (Dell'Ariccia et al, 2016). The authors discovered that banks increase their risk-taking in low interest rate environments. This effect is less pronounced in poorly capitalised banks, meaning it is more evident in well capitalised banks. This is probably due to that poorly capitalised banks are more prone to risk, even before low interest rates. The effect is in a statistical sense robust, but the importance of their finding should not be exaggerated. It is however an indication of how systemic risk can increase due to expansionary monetary policy.

## 3.5 Additional literature

To perform a comprehensive analysis of the primary and secondary data, many sources needed to be studied. Therefore, additional literature has been used. Below in chart 3.3 is a quick summary of these sources.

*Chart 3.3: Summary of additional literature used. Author's own copyright.*

| **Literature** | **Relevance** |
|---|---|
| *The Rationale Behind Capital Structure Decisions: Does Theory Explain Practice?* (Severin and Rademark (2006) | Severin and Rademark (2006) interviewed CFOs regarding capital structure and compared their reasoning with the major theories on capital structure (e.g. trade-off theory and pecking-order theory). |
| **Malinvestment in relation to business cycles and interest rates** | |
| *Human action* (von Mises, L.) | von Mises discuss the rationality behind the economy. By looking at individuals and incentives, von Mises tries to explain complex market phenomena. His discussion of malinvestment and overinvestment will be used in the analysis section. |
| *Explaining Malinvestment and Overinvestment* (Sechrest, L.) | Sechrest expands on the theory of unsustainable economic expansion by elaborating on the concept of malinvestment and overinvestment. |
| **The debate around expansionary monetary policy: Svensson vs Riksbank** | |
| *Monetary Policy and Japan's Liquidity Trap* (Svensson, L. E. O.) | Svensson discusses the use of a Fool Proof Way (FPW) for Japan to end their deflation. He discusses the use of Quantative Easing, ZIRP and strategies for escaping the liquidity trap. |
| *Review of Riksbank's Monetary policy 2010-2015* (Goodfriend and King) | This is a review of the monetary policies undertaken by the Riksbank in the years 2010 to 2015. It is a comprehensive study of the rationale behind ZIRP and NIRP. |
| *Articles, op-eds and written reflections* by Paul Krugman | Paul Krugman is a leading economist and Nobel laureate. He has at length voiced his opinions about the monetary policies undertaken by the Riksbank, often opposing them and outright critiquing them. |
| *Speeches, press releases, minutes of meetings, reports published* by Riksbank. | Official communiqués made by the Riksbank have been studied to understand the rationale behind the ZIRP and NIRP. |

This concludes the literature review. The central themes of this study have been covered: monetary policy, capital structure, debt and economic sustainability. Next, chapter *4 Results*, will describe key measures related to these themes and how they have developed in the last decade leading up to 2017 as well the interview study results.

# 4 RESULT

In this chapter, the results from the secondary data and the interviews will be presented. The chapter will be divided in the following sub-chapters:

- Trends during the last decade;
- Academics' view on the present economic environment;
- Two perspectives on the current situation.

## 4.1 Trends during the last decade

This section aims to give an overview over what has occurred during the last ten years in terms of key measures. Data for inflation, repo rate, capital structure and debt are presented. At the end of this chapter new banking regulations are discussed, since these play an important role when companies choose their debt compositions.

### 4.1.1 Inflation and repo rate

As of 1993, the Riksbank's primary target is to maintain price stability. To this end, a target inflation rate of 2% per year has been set. Following the financial crisis of 07/08, the relation between *business cycles* and inflation does not hold. Sweden has had low inflation (see figure 4.1) despite growth. Recovering from the recession, inflation plummeted in 2012 and stayed low, despite a low repo rate and significant growth (Statistics Sweden, n.d.b). This was a completely new situation where inflation did not seem to budge despite a, in historic terms, extremely low repo rate (see figure 4.2).

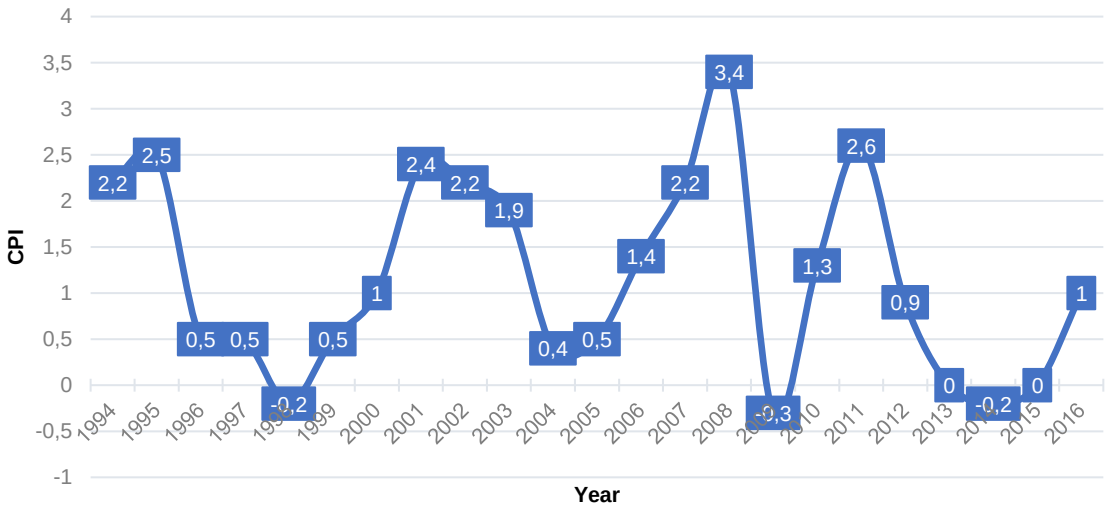


*Figure 4.1: Historical CPI inflation. Y-axis is inflation measured as CPI. The x-axis is year (Statistics Sweden, n.d.a). Author's own copyright.*

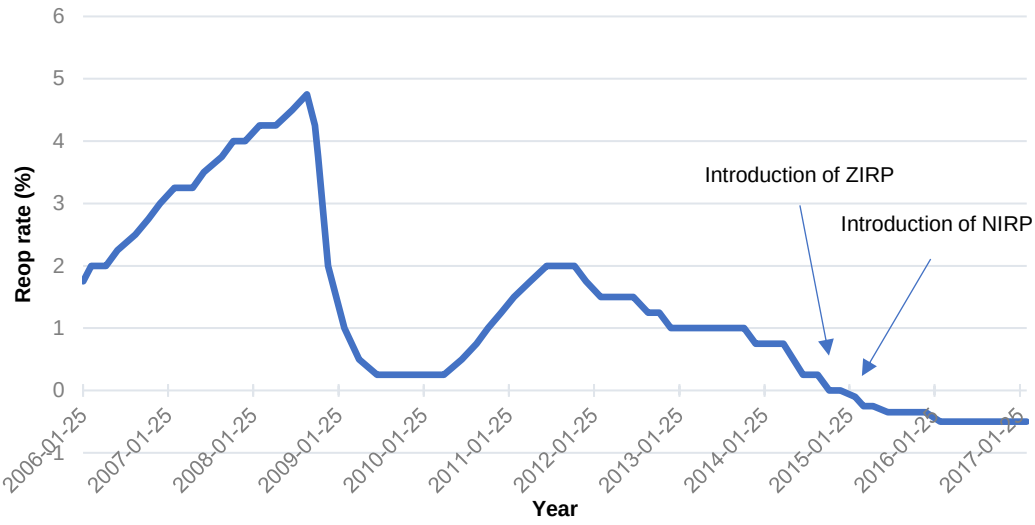


*Figure 4.2: Riksbank's repo rate in a ten-year interval. Y-axis is the repo rate in %. X-axis is year (Riksbanken, n.d.f). Author's own copyright.*

### 4.1.2 Capital structure

The figure below shows the capital structure, in terms of debt and equity, of all Swedish companies listed as either *small-*, *mid-* or *large-cap* on the stock exchanges NASDAQ Stockholm or First North. The capital structure is in this report, as previously mentioned, operationalised as solvency, i.e. equity in relation to all assets.

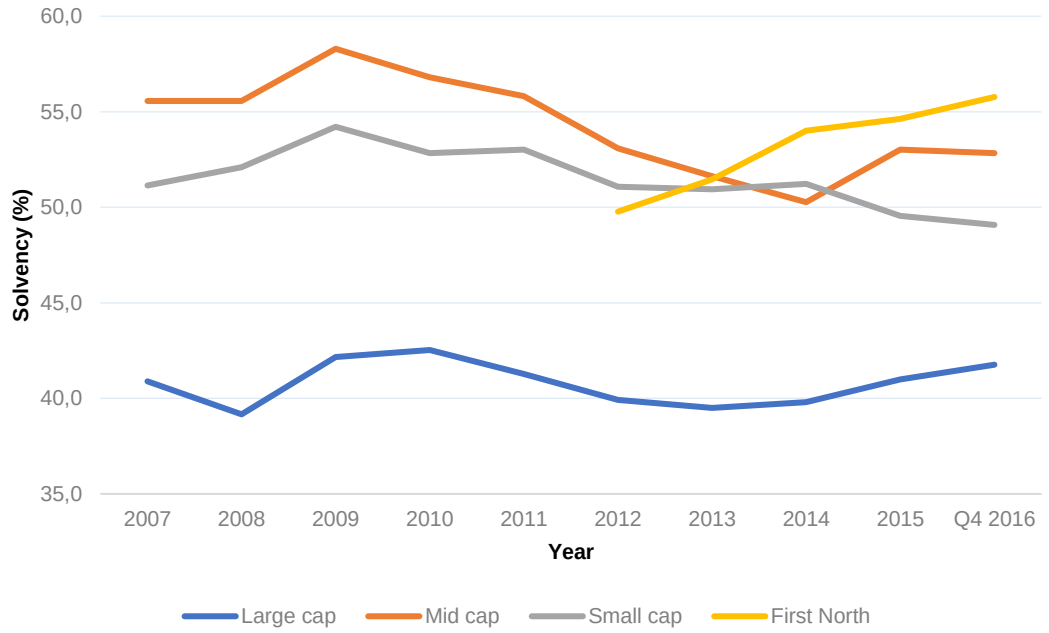


*Figure 4.3: Solvency for Swedish listed companies over time. Y-axis shows solvency as operationalised in equation 1 (p.15). Data is found in Appendix H-K. Author's own copyright.*

The general pattern for all companies apart from small cap companies are:

1) a solvency increase in the 2008 - 2009 period;
2) a decrease in solvency until 2014;
3) an increase from there up to and including 2016.

It should be noted however that company solvency has in general stayed quite stable.

The solvency of small-cap companies follows a different pattern. The solvency of these companies has decreased as the repo rate has decreased. Potential reasons for the differing patterns of small cap versus large cap companies will be explored in the analysis chapter.

### 4.1.3 Bank lending

Corporate bonds are not the only securities on the rise. Monetary financial institutions (*MFI*) are lending more than ever. MFIs include banks and other financial institutions that lend money[10]. Figure 4.4 shows how MFIs and banks are continuously increasing their lending[11]. The banks are in essence creating money (Cervenka, 2013). Therefore, the supply of money is increasing rapidly (see figure 4.5).

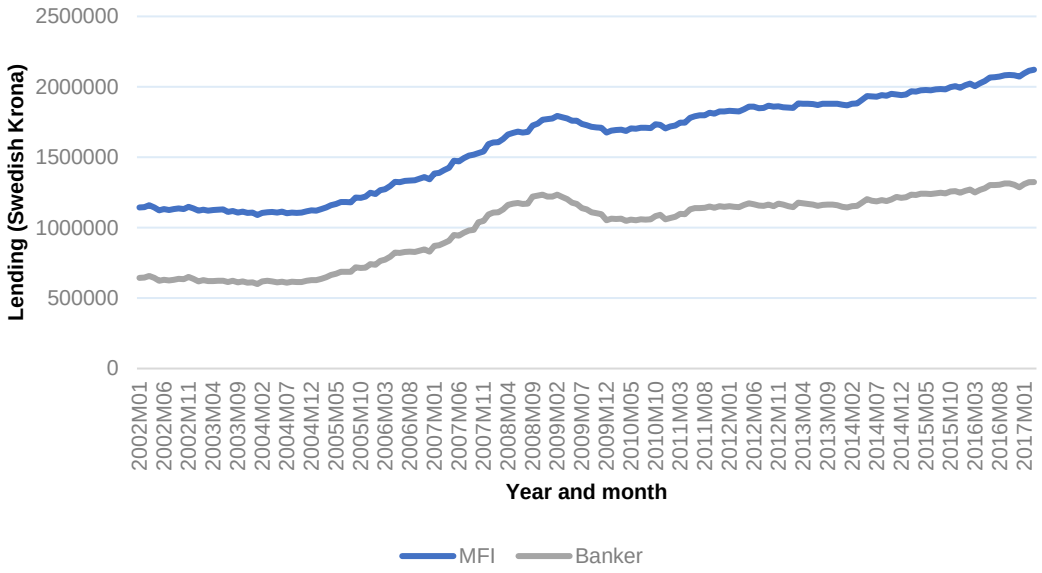


*Figure 4.4: Lending in Sweden for both Banks and MFI. Y-axis is the accumulated amount of lending each month. Sweden (Statistics Sweden, n.d.c). Author's own copyright.*

From 2014, when ZIRP was introduced, there is steeper increase in money supply in terms of M1 (see figure 4.5). There are different definitions of money supply, and M1 is one of those

[10] "*Monetary Financial Institutions (MFIs) include banks, mortgage institutions, financial companies, municipal and corporate-financed institutions, monetary securities companies and monetary investment funds (money market funds)*" – Riksbank

[11] Note the bump around the financial crisis of 07/08

definitions (ECB, n.d.). M1 include assets that can be liquidated and be put to use instantly. That includes all cash and money on bank accounts that can be used immediately.

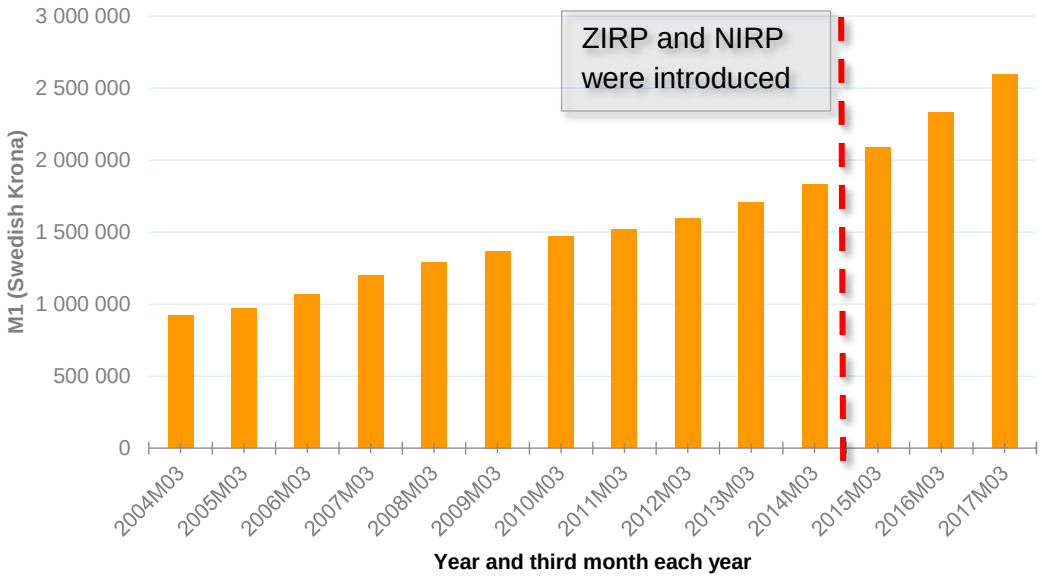


*Figure 4.5: M1. Money supply in Sweden (Statistics Sweden, n.d.d). Author's own copyright.*

Moreover, trends show that the usage of new, previsouly rare types of debt, is increasing. As will be discussed in the next chapter, there is a belief amongst interviewees that cheap money is partly the reason for the growth of the high-yield bond market. Four trends have been noted by scholars:

- the fraction of corporate bonds in relation to regular bank loans is increasing (Bonthron, 2014);
- the fraction of high yield bonds is increasing (Bonthron, 2014);
- the fraction of corporate bonds without credit rating is increasing (Bonthron, 2014);
- the fraction of loans without collateral is increasing (Svanäng and Lindblad, 2013).

### 4.1.4 Bank regulations

In the aftermath of the financial crisis of 07/08, stricter regulations were seen as necessary to avoid future crises and bank collapses (Riksbanken, 2011). The Basel Committee, an international committee for banking supervisory, presented a new category of regulations after the 07/08 crisis, called *Basel III*. This new framework, for liquidity and capital requirements for banks, originates from earlier regulations, *Basel I* and *Basel II*. Basel III was approved by the Swedish government in 2010, and is to be implemented sequentially from 2013 and fully set in practice in January 2019. The main differences from Basel II are raised and tightened capital requirements. For instance, can *Goodwill*[12] and hybrid capital not be included to the

[12] Goodwill is the amount exceeding the purchased company's value in an acquisition.

same extent in *core capital*[13]. When Basel III is fully implemented, the banks will need to have a *tier-1 capital ratio*[14] above 7%.

During Basel I, all Swedish banks were using the same standard when assessing risk. Since Basel II was introduced, they determine their own risk levels based on internal models (Bank for International Settlements, 2008). The tier-1 capital ratio combined with the risk modelling could be compared with the Swedish mortgage loans needs to be capitalised up to 15%. This higher figure, 15%, is in place to protect the banks from households defaulting. Households, implicitly take on the role as a bulwark against financial instability, which was criticised by the economist Johan Grip in a widely-publicised opinion piece in the Swedish paper *Dagens Nyheter* (2016).

The critique was iterated by Grip and other economists and practitioners in the financial sector in an episode of the podcast Kapitalet (Bursell, 2016a; Bursell, 2016b). This episode is part of a series covering the banking sector's capitalisation and risk modelling. The Riksbank and FI have for similar reasons as Grip advocated for higher capital requirements than what is stated in Basel III. They argue that this is a necessity due to relative size of the financial market in Sweden. A large financial sector, relative the whole economy, can result in negative effects in case of a bank crisis (Ekholm, 2013). The Swedish banks did however perform good on a 2016 EU-wide stress test (Finansinspektionen, 2016), showing an increased resilience against a sharp deterioration of the economic environment.

## 4.2 Academics view of the present economic environment

Three academics were interviewed about the economic sustainability of NIRP and ZIRP. Below is a quick summary of their thoughts.

**Christian Sandström**

Dr Christian Sandström, Associate Professor at Chalmers University and Technology and the Ratio Institute argues that the current inflation target has potentially grown outdated. His work is primarily focused on technological change and digitalisation. He notes that as more products are digitised prices are pushed downwards. Dr Sandström argues that this is done by two mechanisms primarily:

- digital products are subject to *Moore's law*[15] and thus reduce in price over time;
- digitalization of markets (e.g. e-commerce) make them more efficient (e.g. by reducing transaction costs).

[13] Core capital consists primarily of equity and retained earnings, and the minimum amount the bank is obliged to have at hand to meet regulations.

[14] Tier-1 capital ratio is the equity capital divided by the risk weighted assets.

[15] Moore's law says that computer processing power is doubled every other year (Mooreslaw, n.d). This is an observed phenomenon and is the reason why digital products decrease in price over time.

**Jan Jörnmark**

Dr Jörnmark is not worried about low inflation. He argued that it is more dangerous for an economy to have high inflation. He says that Sweden is potentially in a liquidity trap. Moreover, he says that Moore's law and globalization is an important reason for the low inflation. When asked about the target of 2% inflation, Dr Jörnmark said the target seemed a bit arbitrary.

Jan Jörnmark is an economic historian that has written much about the housing market and housing bubbles. When discussing the possibility of a housing bubble with Dr Jörnmark he explains that he does not worry about housing prices. Rather, what some mistake for a housing bubble, is just a change in relative prices.

**Taylan Mavruk**

Dr Taylan Mavruk is a senior lecturer and Assistant Professor of Business Administration at University of Gothenburg. He is part of the Industrial and Financial Management Group. Mr Mavruk studies the fields of empirical portfolio choice; biases in investing, primarily local and home biases; risk-taking behaviour of mutual fund managers. Mr Mavruk emphasised the strong local factor of home locality in investing and that people tend to want to invest in companies, stocks or other securities that they are familiar with.

## 4.3 Practitioner perspectives on ZIRP and NIRP

A total of nine interviews with investment banks and investment firms were conducted. First, the investment bankers' view on ZIRP and NIRP, and their effect on corporate financing decisions, will be presented. Thereafter, the investment firms' perspective will be presented.

### 4.3.1 The investment bank perspective

According to several of the interviewees, the repo rate controls the market in a significant manner. They explain that it sets the required yields, and therefore controls the different types of investments made. Some of the interviewees argue that the low interest rates have forced investors towards investments with higher risk, in order to receive the same yield as they would have for instance five years ago. The consensus was that higher risk is necessary for a potential high yield, as it cannot be generated through low risk investments, with today's monetary policy.

All interviewees implied that the expansionary policy has increased inflow of capital to the financial market. As a result, they argued, companies are more eager to take on debt and the subsequent risk. Furthermore, the relatively cheap capital has encouraged companies to borrow money and save it for future needs, instead of investing it. However, some of the interviewees argued that their overall impression is that companies in general have increased their debt-to-equity ratio because of the low interest rates, and shows a slightly more "aggressive" attitude in their financial structures. This is somewhat confirmed for smaller companies later in this thesis, in an analysis of solvency.

Moreover, the interviewees explained how the financial market today is in a completely new situation, as the current *boom* is not contracted by higher repo rate, but prompted by the negative. This contradicts the "textbook solution", which explains that booms should be contracted with a higher repo rate. The number of IPOs has also increased, which is common during a boom, but has even reached a record-high level during ZIRP and NIRP. As discussed by several of the interviewees, capital markets are extremely complicated and hard to evaluate. However, the concluded opinion seems to be that the economy might not be going in the right direction with the current monetary policy.

**Changes in capital structure during the last five years**

The financial crisis of 07/08 resulted in a significant increase of control over the financial system by external authorities, as well as tightened regulations, according to the interviewees. They suggest that the aim with this strategy is to maintain financial stability. Although banks have become more willing to lend, they have new and higher demands[16] on companies wanting to borrow money. The interviewees claim to see some of the same tendencies in the market as before the recent crisis. However, some of them argued, today there are more regulations and not the same variations in corporate-loan-ratios as before.

The interviewees explained that capital in search for higher yield has flowed to the stock market, as the repo rate has decreased. Additionally, they argued that the high yield market has grown, especially on the corporate bond market. They explained this is due to investors' need to take on more risk to gain desired yield. Another explanation for the growing corporate bond market, highlighted by one of the interviewed, are regulations. In difference from bank loans, which puts the debtor under more pressure because of high demands, corporate bonds do not require the same type of assurance as loans. Moreover, this is particularly true regarding high yield bonds, which is why they are sometimes preferred.

Regarding economic sustainability, it plays a substantial part when advising companies on the most suitable capital structure, according to the interviewees. They pointed out that companies always aim to maximise yield, and return on equity. Although this is done by using leverage, they highlight that managing the risk, that follows from taking on debt, is vital to survive.

**Bankers' view on ZIRP and NIRP**

A common opinion among the interviewees was that ZIRP and NIRP have put Swedish markets in an entirely new situation. This, according to the interviewees, is due to the Riksbank's solid focus on the predetermined inflation rate. One of the interviewees discussed alternative choices, but ZIRP and NIRP were considered the only feasible options, since a rapid increase in repo rate could potentially put Sweden in a situation similar to the recent financial crisis. Though it eventually must be done, the interviewees agreed that the financial market is in a sensitive position, and emphasise the importance of increasing the repo rate with great care.

[16] E.g. regarding due diligence and credit assessment.

Furthermore, several of the interviewees questioned whether ZIRP and NIRP are sustainable in the long run. They argue that these policies normalise high debt quotes, due to the low cost of debt, and stated that a following consequence could be increased risk for both creditors and debtors. One interviewee suggested it could have been better to stay on a zero interest rate policy, to maintain stable asset prices and a lower level of aggregated debt.

Some of the interviewees also highlighted the relevance of increasing the Riksbank's scope. It was suggested that a wider view on the financial market in general could form a better foundation when deciding on monetary policy. They agreed that the Riksbank have been too focused on the inflation rate, and that it is a real existing issue. Another common opinion among the interviewees was the extensive involvement of Finansinspektionen, FI, and regulations are more problematic than helpful for the banks' function. A more unregulated financial sector, where the system could operate more as a *market economy*, was desired.

To summarise, a wider view of the financial system and less focus on the inflation rate could lead to better decisions by the Riksbank, according to the interviewees. Moreover, all five agreed on the fact that the aim for a 2% inflation is outdated in today's modern financial climate.

### 4.3.2 The investment firm perspective

A series of three interviews were conducted with professionals on the "buy-side" of the market. All three of the interviewees were investment managers in three different investment firms.

**Availability of credit has increased significantly**

There was a broad consensus amongst the investment managers that ZIRP and NIRP has made borrowing significantly easier. One of the investment managers, Charlie, explicitly stated that it is "*extremely clear*" that banks want to issue debt. All three of the interviewed professionals explained that, in general, investment firms accrue more debt today than previously. They also mentioned that the costs for buyouts are noticeably higher than previously. One of the interviewees, investment manager Alpha, believed the increase in cost is due to investment firms having more capital than ever before. According to the investment firms, NIRP has made it unattractive for *entities*, such as mutual pension funds, to deposit their capital in banks or invest in low-risk bonds. The "*need for yield*" has driven such investors towards investment firms. This cash injection coupled with readily available debt have driven the price points up.

The relationship with the banks has continued to be good, even after the introduction of ZIRP or NIRP. Therefore, all three investment managers were unified in the view that neither themselves as firms, nor their portfolio companies, notice any notable change in the availability of credit from bank loans.

**Changing loan patterns**

A common theme throughout the interviews was the notion that a change in loan patterns have occurred. Regarding debt, all three companies primarily want to utilise bank loans. In general,

banks loans offer a lower interest rate and less risk compared to other loans, or alternatively using equity. Despite this, these bank loans are being less used in LBOs. The shift towards other types of loans, such as PIK or mezzanine, are according to the investment managers, due to that they are "covenant-light". When investment manager Charlie explained the rationale for using these types of loans are threefold: 1) an unwillingness to amortise; 2) added flexibility; 3) a function of the lower floor of fees the banks charge. Even though the interest rate is 0%, there are added fees which in effect makes the effective interest rate above zero. Therefore, investment firms in this low-rate environment begin to search for loans with zero interest rate and no fees. These PIK-loans were addressed in chapter *3.3.1*. The maturity of these loans often coincides with the time schedule for the exit of the investment firm's position. These factors accentuate the willingness to accrue debt, even though it may be at a higher risk.

**Private equity incentive structure**

As discussed above, there was a consensus amongst practitioners that the price for companies are on the rise. One driving factor may be that, to quote Bravo, "*the capital needs to be working*", meaning that the capital needs to be invested in the market and not, for instance, placed in bank account. A common model for yield in the investment business, as one of the investment managers pointed out, is that the investment firm promises returns to its clients[17] based on the time the capital is placed in an investment, for instance years. If the capital is not invested one year, the client does not receive any dividend. If this happens, the client will choose to place its capital somewhere else. As mentioned above, the pension funds are clamouring to invest in the private equity market. They have a fiduciary duty to deliver dividends to their primary benefactors: the public. In the time of NIRP, this is hard to achieve by other means than to place their funds at the disposal of investment firms. The consequence of this, according to the interviewees, is that investment firms need to invest and leverage their positions at an increasing pace.

None of the firms participating in the study had changed their required return after the introduction of NIRP. They all deemed that the higher acquisition multiples, discussed previously in this section, have lead many actors to further leverage their buyouts, just to be able to retain the current required return. There was a consensus that this is more prevalent amongst the investment firms with multiple clients and/or for investments with a shorter time span. Their capital has a higher turnover rating and more susceptible to price increase. Investment firms with a sole point of financing can have their capital placed in an investment for an extended period, sometimes stretching decades. Also, worth noting, is that none of the firms use CAPM or risk-free interest rate, as discussed in chapter *3.1.3*, to any great extent when calculating their projected returns. They have internal rates and therefore fall under the

[17] The term "client" is used to differentiate between an investment firm and the investors in the investment firm's products. Usually the investing firm raises a fund that for example pension funds, wealthy individuals or other companies can invest in.

27% in chart 3.1. None of their investment decisions are solely based on these models. Other factors[18] are considered to be more important.

**Bond market is on the rise**

All the investment firms have to a different degree started to invest in bonds. One company have recently opened a desk to trade bonds, some have portfolio companies that have issued bonds, and investing in convertibles is not uncommon. The investment managers explained that the low-interest rate has led to a search for possible placements outside of depositing in a bank. Therefore, some companies have identified the opportunity of issuing bonds instead, to raise more capital.

**Capital structure during the last five years**

The capital structure of companies in general could have changed during the period from NIRP was introduced, the interviews show. They all answer somewhat in the affirmative to the question if they think that the levels of debt have risen amongst companies, or if they perceive a change in behaviour. During interaction with potential prospect, the investment manager's experienced that they were often more willing to take risks and start new projects. As investment manager Bravo put it "*[the companies] are very much leaning forward*". However, the investment managers believed that the unchanged solvency in big publicly traded companies could depend on the regulation of being listed on an exchange.

All the investment managers claimed that they do not think in terms of "optimising capital structure". This was the case for both portfolio companies and in acquisitions. Other variables are more important. They all work with various kinds of scenario analysis'. As one of the interviewees put it: "*If [the investment firms] see that a ROI of 1 is a realistic scenario, then it's a bad investment regardless of capital structure*".

**Economic sustainability**

They all agreed, these low interest rates are not sustainable over time. Prices are inflated and multiples are near-record high. Eventually, people are going to say, enough is enough. As investment manager Charlie said: "*it's unreasonable that one could borrow for more than the valuation of the company*". The opinions on how the scenario is going to play out differs. They all agreed though, that if the valuations continue to rise, or if interest rates are hiked, the sentiment regarding debt will change. A high leverage position will then be less desirable. This could lead to the velocity on the transaction market slowing down, and perhaps even stop. The investment firms would need to park their investment until they can achieve the desired yield. If this takes a long time, the investment could need to be unloaded at a loss. Still, in this low interest rate environment, despite high acquisition valuations, the spread between LBOs and low risk placements, still speak in favour of leverage, according to Alpha.

[18] These include factors such as growth potential, fit to profile, an attractive business model or team etcetera.

Investment firms have more money than ever. Moreover, the investment manager's reasoned that much of leverage is going unnoticed, since the companies that use the most leverage are not publicly traded. Investment manager Alpha recollects that there is stark difference in the debt-to-EBITDA ratio between the average for companies on the NASDAQ Stockholm and a fund consisting of unlisted companies managed by a big investment firm. It is one-to-two, almost three times higher leverage in the fund with unlisted companies. All three speculated that this low interest environment will continue for between 12-24 months from April in 2017. It is not all doom and gloom however. When asked about the outlooks of the future investment manager Charlie frankly stated that the "*future is bright*".

Having explored two different perspectives amongst practitioners in the financial sector, it is time to analyse how these perspectives stand against each other. Are there major discrepancies between the viewpoints of the individuals and the data? Do the banks and the investment firms have different views on ZIRP and NIRP? Moreover, how can theory and the views of academics be used to explain these different views? In the next chapter 5, *Analysis,* these findings will be compared.

# 5 ANALYSIS

The analysis will compare the different perspectives of banks, investment firms and academics. Each sub analysis results in a set of hypotheses, for future researchers to investigate. The chapter is split into two parts, each elaborating on one of the research questions:

- How have companies' financing decisions been affected by ZIRP and NIRP?
- How has the low repo rate affected economic sustainability?

## 5.1 How have companies' financing decisions been affected by ZIRP and NIRP?

The most recent addition to the Swedish monetary policies is the usage of ZIRP and NIRP. The aim of this subchapter is to analyse how these policies have affected the financial strategies of companies active on the Swedish market. Is there a common trend in the literature, the data and the views of the practitioners? This section of the report takes account for these perspectives, and breaks down the overarching question in four more specific questions:

- Is there a credit expansion?
- What has really happened to capital structure?
- How do practitioners reasoning fit with theory?
- What is happening to debt composition?

### 5.1.1 Is there a credit expansion?

The investment managers agreed on the fact that credit has become increasingly available in recent years and that investment firms have more capital than ever before. As it was shown in chapter *4.1 Trends in the last decade*, this notion is supported by the fact that that the money supply (M1) has increased significantly since 2014. Corroborating this view, are the banks themselves in the quarterly survey sent out by Almi (CMS Research, 2017). In contrast, the bankers conveyed the notion that, since the financial crisis of 07/08, the accessibility of capital has diminished, despite very low interest rates.

The incentive to "*keep the capital working*", as one investment manager expressed it, is corroborated by a study conducted by the management consultant company Bain & Co. One quote from the Bain-report reads: "*underlying this demand are large stores of dry powder and cheap debt"*[19] (MacArthur, H., Haas, D., Varma. S, Elton, G., 2017). All the interviewed professionals at the different investment firms notes that companies in general accrues more debt than previously. Also, here the Bain-report is in concert with the interviewees. MacArthur et al argues that the ratio debt-to-EBITDA in LBOs are on a rise. Figure 5.1 shows the trend from 2005 to 2016 (2017).

[19] "Dry powder" is financial jargon for assets that are highly liquid and as such are cash-like, or de facto cash. Also the term "war chest" is sometimes used to refer to this.

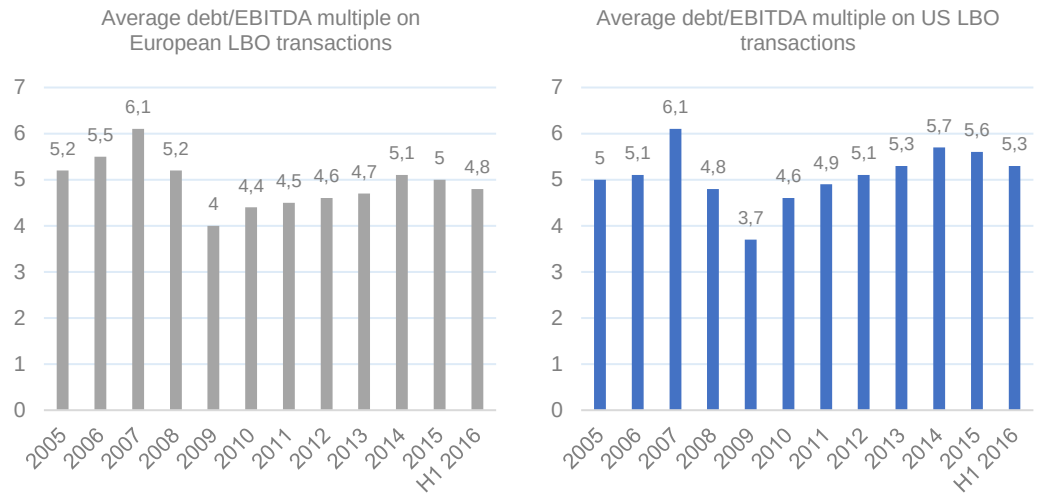


*Figure 5.1: Average multiple of debt-to-EBITDA in LBOs on both the European and US market. Debt market continued to be accommodating for new deals. The y-axis is showing the multiple (MacArthur, H., Haas, D., Varma. S, Elton, G., 2017). Adapted with permission.*

It is not just the size of the LBOs that is rising. The investment managers also mention that the price for acquisitions are noticeably higher than before. This rise in price is confirmed in part by Bain & Co. Their study of the transaction markets in the US and Europe show that both markets have an acquisition multiple of around 10 times EBITDA. This is near-record high. Figure 5.2 below shows the development from 2007 to Q3 of 2016 (2017).

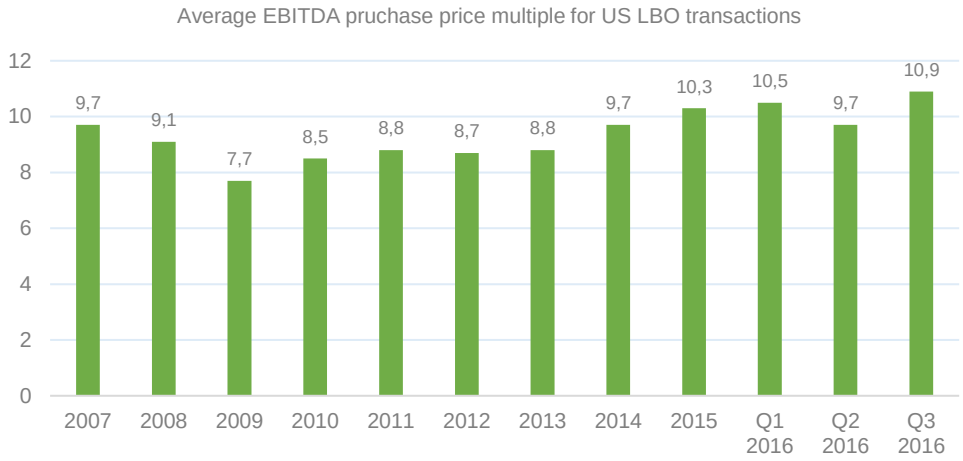


*Figure 5.2: Average multiple of EBITDA in acquisitions (US market). Acquisition multiples rose to record highs in Q3 2016. Y-axis shows multiple (MacArthur et al., 2017). Adapted with permission.*

Since Sweden is a part of the global market with free capital flows, it is reasonable to assume that the global trends are reflected on the Swedish market.[20]

[20] This notion was supported by several of the interviews.

This rise in valuation multiples is internalised in such a manner that one investment manager outright said that they are not looking for new targets, and another claim they are restrictive of acquiring new prospects. To further enunciate the fact that the prices on the Swedish market may soon be starting to run a bit high for the investment managers, one of them describes a case regarding the difference of the price for acquisitions on Swedish market and other countries in Europe:

"*The firm have invested in a Swedish commercial online retailer. It has an almost identical mirror copy in Germany. The German company is active on continental Europe, in at least seven different countries. Still, it is traded at roughly half compared to the Swedish counterpart.*"

The investment firms are not alone with being reluctant to invest. The chairman and CEO of Berkshire Hathaway, Warren Buffett, told CNBC in May 2017 that he was opting-out of investing their $90 billion of equity in the current market (Belvedere, M. J., 2017). Mr Buffett says: "*...but the very fact that interest rates are that low makes it hard for us to buy other things because other people buy things with borrowed money, and borrowed money is so cheap*". He also added that "*if we are competing with equity money against slim equity plus a lot of debt, we're at a disadvantage*". The managing partner of the $38 billion Swedish investment firm EQT (Rolander, 2017) also talks about debt-funded acquisitions and warns of a brewing storm. They are preparing their portfolio companies because "*the storm will come*".

Notably, none of the investment firms experience that borrowing from banks is neither easier nor more difficult than before. The quarterly survey of banks issued by Almi corroborates the notion that this to some extent is true. The interviews conducted by CMS Research shows that those companies that had a good relationship with their banks are hold to the same standard as previously regarding borrowing (CMS Research, 2017).

The interview study conducted with the banks and investment firms supports the hypothesis put forth by Severin and Rademark (2006) that interest rates is a major factor to consider when taking on debt. Bain & Co also points out that by the end of 2016, private equity firms "*in every region had refilled their buyout coffers faster than they could put the capital to work*" (MacArthur et al, 2017). Based on this the following hypothesis can be postulated:

**Hypothesis 1: The credit expansion is partially explained by ZIRP and NIRP.**

**Hypothesis 2: ZIRP and NIRP are in part responsible for today's record high valuations.**

### 5.1.2 What has happened to debt composition?

It is clear from the perspectives of both the investment firms and bankers that debt composition is changing. High risk, high yield debt is increasing. There is arguably a supply-side as well as a demand-side component to this fact.

The supply of money to high risk loans has increased since these provide organizations and individuals with the yield they require. This is perhaps, as one of the bank interviewees argued,

one reason for the increased amount of high yield bonds (Bonthron, 2014). Arguably, it is this supply side component that is the most important.

Moreover, from the demand side perspective: the multiple for acquisitions are, as shown in figure 5.3, high. This creates a need for more leverage, but it is increasingly not the usual bank loans being used in LBOs. This is also stated by MacArthur et al in the report made by Bain (2017). One reason cited by a bank interviewee is the fact that banks have become more regulated. These regulations affect the borrower directly by making covenants stricter. There is a cost associated with navigating these stricter covenants for the borrower. An investment firm interviewee elaborates on this point and explains how they have started to use bonds and other types of loans that are much more flexible than bank loans. Another interviewee, a banker, corroborates this view - the bond market is on the rise. An investment manager described how a recent transaction was financed through a form of mezzanine loan, an unitranche debt[21]. Something that is relatively new. In figure 5.3, the increased risk associated with these types of debt is shown.

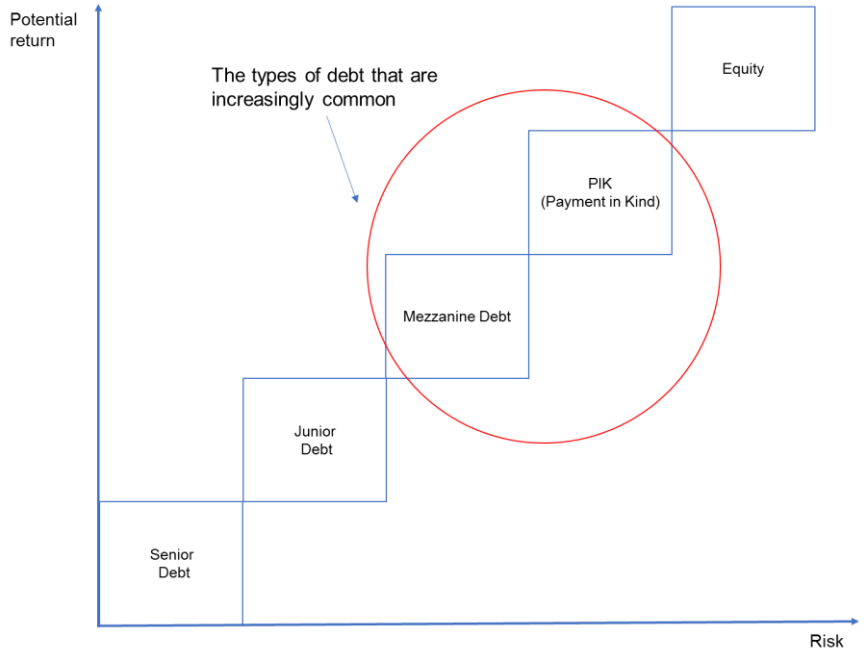


*Figure 5.3: The types of debt that has become more common are covenant-light. Author's own copyright.*

All in all, supply and demand side are both creating a push towards other types of debt. Consequently, these are becoming more lucrative and this is something even the major banks have noticed. For instance, Goldman Sachs opened a mezzanine fund in 2016 (Oran, O., 2017). Moreover, many of the interviewees cite the low interest environment as an important reason for the rapid rise in the high yield bond market.

[21] Unitranche debt is a hybrid structure of debt containing different kinds of prioritised debt

The literature reviewed predicts that loan structures will change in the direction described above. That is, given that yield requirements stay the same, capital will be moved to riskier loans and securities. Empirical evidence discussed in chapter *4.1 Trends in the last decade* supports this view (Bonthron, 2014). Based on the literature review, the empirical evidence and the interviews, following hypothesis is postulated:

***Hypothesis 3: The high yield corporate bond market has grown, and other types of high risk loans have become more common, as a result of stricter regulations in combination with ZIRP and NIRP.***

### 5.1.3 What has happened to capital structure?

As shown in the chapter *4 Trends in the last decade*, solvency has not decreased significantly during the last five years for listed companies. On the contrary, large and mid-cap companies has seen an increase during the last three years. The same is true regarding First North companies. In other words, the debt-to-equity ratio has decreased for these companies. Only for small-cap companies has the debt-to-equity ratio actually increased during the period of ZIRP and NIRP, which can be seen by the decreasing solvency.

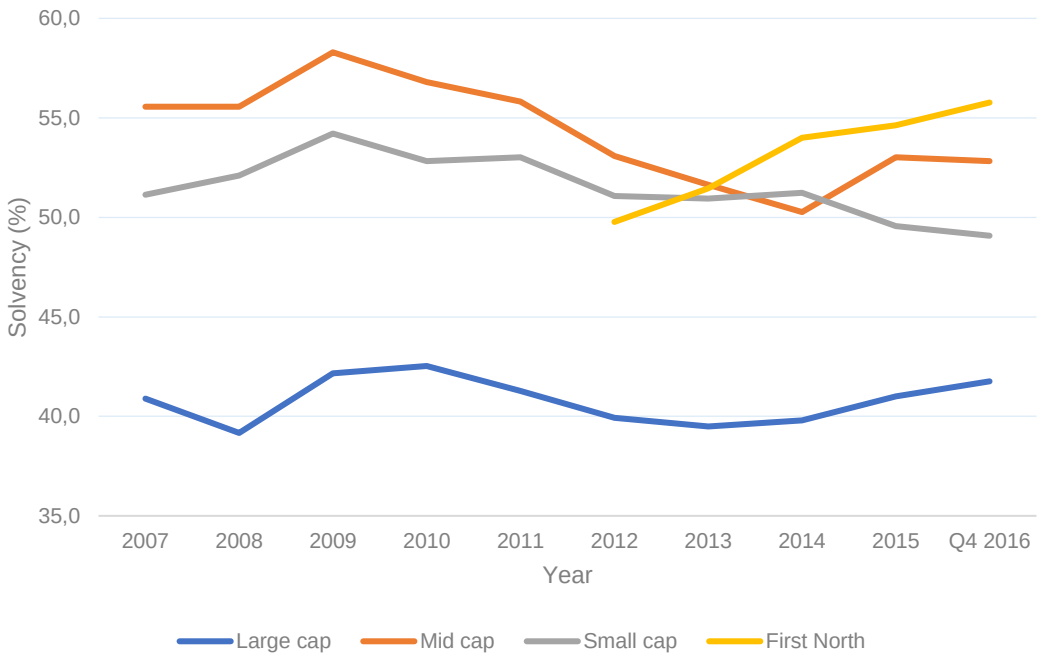


*Figure 5.4: Solvency for Swedish listed companies over time. Y-axis shows solvency as operationalised in equation 1 (p.15) (The same graph can be found as 4.3) Data is found in Appendix H-K. Author's own copyright.*

However, almost all practitioners in both banks and investment firms argued that debt-to-equity ratio has increased. The experience of several of them was that companies were increasing their debt-to-equity ratio. Who is right? And what is the cause of this discrepancy? One potential reason is that the data sample on solvency is not representative of the economy as a whole. This

study's data sample does not include any unlisted companies. Sweden has roughly 1 200 000 companies (Statistics Sweden, n.d.e). According to the Swedish bank Avanza Sweden has 785 companies being publicly traded (Avanza, n.d). Consequently, the number of publicly traded companies account for less than 0.065% of the Swedish market. Could it be that the debt-to-equity ratio is increasing in unlisted companies, but not in listed companies?

Two pieces of evidence support this point:

- An interviewee at one of the investment firms, explained how unlisted companies take on even more debt.
- The debt-to-equity ratio of small cap companies in our data sample did have a quite pronounced inverse relationship to repo rate (see figure 5.5). That is, the debt-to-equity ratio of small listed companies has actually increased as interest rates has decreased.

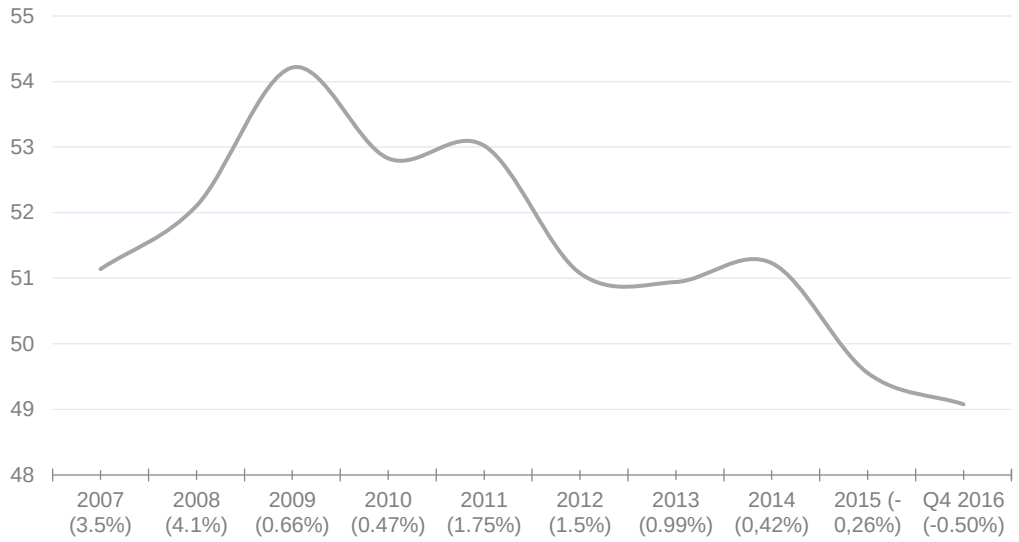


*Figure 5.5: Small Cap Solvency (equity / total assets). The weighted average repo rate is included on the x-axis after each year. Data is found in Appendix J. Author's own copyright.*

The correlation between repo rate and solvency is weak for small cap companies (r=0.30)[22]. However, following a similar argument of Almlöf, Hafdell and Fröding (2016), it is arguably reasonable to look at the relationship between repo rate and solvency of the following year[23]. By shifting the solvency one year, potential interest rate effects have time to take hold. Indeed, when doing this, another picture emerges. Now the correlation is 0.605, which is a strong correlation Evans (1996) (see figure 5.6). This correlation can be contrasted with the almost non-existent relationship between debt-to-equity ratio and the repo rate as found by Almlöf,

[22] Correlation measures are used to investigate how two variables covary (Taylor, 1990). A correlation takes on a value between –1 and 1 where 1 means a perfect correlation.

[23] They, however, shifted it by two years.

Hafdell and Fröding (2016)[24]. Moreover, this study found weak *negative* correlation (-0.2) for the sample of larger companies.

*Chart 5.1: Correlation Riksbank's repo rate and solvency. See appendix G for calculations. Author's own copyright.*

| Correlation: Riksbank's repo rate and Solvency | |
|---|---|
| **Data set** | **Pearson's r** |
| Small Cap +0 year | + 0.3025 |
| Small Cap +1 year | + 0.6050 |
| Mid Cap +0 year | + 0.3355 |
| Mid Cap +1 year | + 0.5111 |
| Large Cap +0 year | - 0.4689 |
| Large Cap +1 year | - 0.2098 |

Why then would size be a moderating variable[25]? Or why would whether the company is listed be one? In other words, why would the capital structure of smaller, and perhaps unlisted firms, have a stronger relationship with the repo rate? This study highlights four plausible explanations:

a) Listed companies face more constraints

Investment manager Alpha argued that unlisted companies do not face the same constraints and monitoring as listed companies do. Unlisted companies can take on a lot more risk. For instance, listed companies do not use mezzanine to the same extent according to an investment manager. Listed companies have many minority shareholders that cannot affect capital structure, which constrains listed companies from taking on too much debt. In other words, the trade-off between debt and equity is perhaps quite different between listed and non-listed companies. Moreover, as this interviewee also explained, their company operates on a global market and has a planning horizon of over 20 years. This makes the current repo rate less important, when it comes to "optimising" capital structure.

b) Solvency of small companies is more easily affected

Smaller companies, by definition, do not need to take on that much more debt to notably affect solvency. Ceteris paribus, decreasing the solvency of a $10 company by 10%, does not take as much debt as decreasing the solvency of a $1 000 000 company by the same percentage.

[24] Almlöf, Hafdell and Fröding (2016) are entirely comparable as they looked at debt-to-equity ratio.

[25] A moderator is a third variable that affects (moderates) the strength of the correlation of two variables.

c) Large companies have more retained earnings at their disposal

It could potentially be that larger firms have more retained earnings that can be used to avoid taking on debt. This would be in line with the Pecking order theory of capital structure (see chapter *3 Literature Review*).

d) Pecking order becomes more important in smaller companies

Given that smaller companies do not have the same access to retained earnings, they face a choice between debt and equity. Theory has it, that small firms should be more likely to follow a pecking order as information asymmetry is larger (Ni and Yu, 2008). In other words, left with the option between debt and equity, they have stronger incentives for going with debt, than larger companies would have. Perhaps this explains why the capital structures of these companies seem to have been more affected by the low interest rates.

Moreover, there is another possibility for why the debt-to-equity ratio has decreased, rather than increased, for many companies. This reason does not necessarily have to do with firm size. Instead, it is possible that the increased debt is offset by an increased value of equity. This could happen via three mechanisms:

- As asset prices has risen this has enabled revaluations of assets. In other words, increased market value of equity enables some firms to increase book value of equity.
- A lower repo rate often stimulates growth (Fregert and Jonung, 2014). That in turn means larger profits, which increases the value of equity. That is, previous year's profits go into book value of equity.
- The firm issues equity because of many investors being more willing to invest in a low interest rate environment.

These three mechanisms could perhaps explain why some companies' debt-to-equity ratio have decreased.

Lastly, none of this is to say that the repo rate is a *cause* of the capital structure of smaller companies. It is incredibly difficult to exclude other factors as there are many potential confounding variables. Moreover, the sample size is small and the relationship between capital structure and repo rate is not necessarily linear at all. The correlations serve mainly to complement the graphs. Too strong claims on capital structure are dubious. However, based on the interviews and the solvency data, the following hypothesis is postulated:

***Hypothesis 4: Firm size is a moderating variable of the relationship between firm capital structure and repo rate.***

### 5.1.4 How does practitioners' reasoning fit with theory?

The interview study seems to support several of the hypothesis set up by Severin and Rademark (2006). In their Master's thesis, they interview CFOs about capital structure choice and investigate how practice relates to the major theories of capital structure. They conclude with a

list of hypotheses. One overarching hypothesis is that the main theories of capital structure does not really explain the reasoning behind the choice of capital structure (see H2 in chart 5.2). Rather, when theory gets it right, it explains the outcome of the reasoning rather than the reasoning itself. Here is a list of their hypotheses for which the study at hand lends support. It should be noted again that this study looks from an investment firm perspective and bank perspective rather than a CFO perspective.

*Chart 5.2: Capital structure hypotheses (Severin and Rademark, 2006).*

| **Capital structure hypotheses (Severin & Rademark, 2006)** | |
|---|---|
| Hypothesis 2 | *"The capital structure theories address mere factors in capital structure decisions, and not the actual reasoning behind these factors"* |
| Hypothesis 2c | *"The financing hierarchy costs in the pecking-order model is not based on relative costs of informational asymmetries"* |
| Hypothesis 2d | *"Companies are concerned very little or not at all with tax benefits of debt when deciding on altering their capital structure"* |
| Hypothesis 2e | *"Companies do not intentionally use their capital structure as a mean to compete"* |
| Hypothesis 3 | *"When choosing a target capital structure, companies are concerned with covenants"* |
| Hypothesis 4 | *"When choosing a target capital structure, companies are concerned with credit ratings and cash-flow measures"* |
| Hypothesis 5 | *"Interest rates are important when companies decide to take on new debt"* |
| Hypothesis 8 | *"When choosing a capital structure, companies are concerned with flexibility"* |

Supporting hypothesis 2, most of the investment firm interviewees that took part in this study showed a lack of a concern of an optimal or target capital structure. When asked specifically about capital structure, most initial responses were: "*that is not a major or deciding factor*". Moreover, when discussing debt composition, most interviewees talked about, flexibility, cash flow and covenants supporting H3, H4 and H8.

One interviewee explicitly said, "*we choose bank loans first and foremost*". In that sense, there was a pecking order. On the other hand, when asked why, the reason was just that it was cheaper than equity. The interviewee was unconcerned about information asymmetries when asked specifically about these. This lends support to hypothesis 2c.

All in all, the interview study supports Severin and Rademark (2006) conclusion that the major theories of capital structure can be misleading in that they do not describe how practitioners think about capital structure. Rather, the models can be said to be "as-if" models as Milton Friedman would have put it (Lehtinen, 2013). That is, though the Trade-off theory and Pecking

order theory sometimes predict firm behaviour they do not necessarily give the *"real"* reasons for this behaviour. Based on this, the following three hypotheses are postulated:

***Hypothesis 5: Investment managers do not reason as the Pecking Order Theory or the Trade-Off Theory of capital structure would predict.***

***Hypothesis 5a: Investment managers do not think in terms of optimizing capital structure.***

***Hypothesis 5b: The major reason practitioners give for a pecking order is capital cost, rather than information asymmetries.***

## 5.2 How are ZIRP and NIRP affecting economic sustainability?

There are differing views amongst practitioners and academics on whether the current situation is sustainable and what should be done. A review of the policies enacted by the Riksbank in the years between 2010-2015 concludes that the Riksbank made adequate decisions. The review was a part of a series of studies that the Riksbank conducts in roughly five year intervals. This specific one was performed by Marvin Goodfriend and Mervyn King and as the authors mention, the period was particularly turbulent and encompassed great divides among the Executive Board of the Riksbank (Goodfriend and King, 2015). To counterbalance the vindication made by Goodfriend and King almost all practitioners that were interviewed for this paper argued that the low rates (i.e. negative repo rate) are not sustainable over time. The following questions will now be discussed:

- Is the Swedish monetary policy expansionary?
- Does Sweden really have a low repo rate?
- Is the Consumer Price Index relevant in a time of digitalization and globalisation?
- Is the inflation target valid?
- Is NIRP sustainable?

### 5.2.1 Is the Swedish monetary policy expansionary?

The answer here is highly debated. After the introduction of NIRP one could think that the answer is vehemently "yes". From the layperson's perspective, what could possibly be done more than having a negative repo rate and a quantitative easing program? According to the first deputy governor of the Riksbank, Kerstin af Jochnick, the Riksbank could have even lower rates, purchase more securities and even do more currency interventions (2016). Ms af Jochnick said as much in a speech to SACO[26] in early 2016. The Riksbank also states that they are willing to become even more expansionary. For instance, they are willing to act between ordinary meetings, which is extraordinary (p. 69, Goodfriend and King, 2015).

The argument over the expansiveness of the monetary policies have led to a highly-publicised defection from the Riksbank. The former member of the Executive board of the Riksbank, Lars

[26] Swedish Confederation of Professional Associations

EO Svensson, did not agree with the decision to keep the repo rate unchanged in 2013 (p. 53 Goodfriend and King, 2015). This consequently prompted Mr Svensson to leave his position at the Riksbank. In his leaving statement Mr Svensson says: "... *I have not managed to get support for a monetary policy that I consider would lead to better target fulfilment, with both higher inflation closer to the target of two per cent and lower unemployment"* (Riksbanken, 2013a). Mr Svensson later criticises Goodfriend and King's paper for, amongst other things, not representing the dissenting view at length in their conclusions. He does however commend them for their, to quote Mr Svensson, "*severe and justified criticism of the majority's policy*" (Svensson, L.E.O., 2016). The Nobel laureate Paul Krugman[27][28] has also publicly criticised the Riksbank for what he calls "sadomonetarism" (2014a). In the *New York Times*, he defines it to mean an attitude that "...*involves a visceral dislike for low interest rates and easy money, even when unemployment is high and inflation is low*". Mr Krugman claims in the same op-ed that "Sweden turns Japanese". Interestingly, the study of the Japanese case[29] is something that Lars Svensson is renowned for. He wrote a paper at Princeton called "*Monetary Policy and Japan's Liquidity Trap*" (2006). This is a seminal piece on low-interest environments, and Mr Svensson's main raison d'etre at the Riksbank. In the end, the proposed course of action advocated by Mr Svensson was voted down. This is one reason why there is so much chagrin in the world of economic academics on the departure of Mr Svensson and the actions of the Riksbank.

### 5.2.2 Does Sweden really have a low repo rate?

Why did the Riksbank not want to lower the repo rate earlier? According to Goodfriend and King (2015), many at the Riksbank are worried about the Swedish housing market and the increasing household debt. In their conclusions, they write that due to these concerns, the Riksbank allowed matters of "*financial stability to affect decisions on monetary policy*" (p. 93)[30]. The Riksbank themselves notes in their Monetary Policy Report July 2014 (Riksbanken, 2014) that "...*the risks linked to high household indebtedness will increase. A low repo rate makes it more urgent for other policy areas to contribute to reducing these risks*" (p. 1). When discussing this with Dr Jörnmark, he explained that he does not worry about housing prices. He argued, as he has done elsewhere (Jörnmark, 2016, December 27), that Sweden does not have

[27] A side note is that it is the Riksbank who nominates the Nobel Memorial Prize in Economic Sciences, and as such nominated Paul Krugman.

[28] Paul Krugman, Lars Svensson, Mike Woodford and the former Chairman of the Federal Reserve Ben Bernanke were part of the "Princeton zero-lower-bound Group of Four". Krugman and Svensson are old colleagues at Princeton university.

[29] Japan had under many years had deflation both in the GDP deflator and CPI. This despite of low interest rates, even ZIRP, and measures like quantitative easing.

[30] Dissenting in a monetary policy meeting in April of 2013 (Riksbanken, 2013b), Mr Svensson said that the policies were being conducted in an "*ineffectual and misguided attempt to limit household debt*" (p. 5). He then goes on and lambasts the majority decision by saying "*monetary policy conducted in recent years was a clear and serious failure*" (p. 5).

a housing bubble. Rather, what some mistake for a housing bubble, is just a change in relative prices.

As mentioned, most interviewees in this paper viewed the interest rates as low. Jan Jörnmark, however, begs to differ. As an economic historian known for having quite a unique perspective, he countered the question of low repo rate with ”*who is telling you that we have low interest rates?*” He continued by pointing out that the low inflation makes “*real interest rates*[31]” not as low as many people claim. Looking on a longer time scale, it is not clear that current real interest rates are that low, as inflation has been quite a bit higher in previous periods.

What is apparent is that regarding both monetary policy and sustainability it is hard to untangle the problematics surrounding both the housing market and household debt. As this is outside the scope of this thesis, it is however left for future research.

### 5.2.3 Is the Consumer Price Index relevant in a time of digitalization and globalisation?

As discussed in chapter *3.1 Monetary policy and its consequences,* the measurement for inflation used by the Riksbank is Consumer Price Index. Christian Sandström, associate professor at Chalmers University and Ratio, argues that the current inflation target has potentially grown outdated. His work is primarily focused on technological change and digitalization[32]. It is therefore not surprising that his primary concern, when it comes to repo rate, is the digitalization impact on the relevance of the CPI measure. He has noted that, as more products are digitised, prices are pushed downwards. This is primarily a result of two mechanisms:

- digital products are subject to Moore’s law and thus reduce in price over time;
- digitalization of markets (e.g. e-commerce) make them more efficient (e.g. by reducing transaction costs)**.**

The economy of today is both global and digital. This was something pondered during the interviews. How do we account for this? As a counterpoint to this, the senior researcher at Gothenburg university Taylan Mavruk, discussed the issue of proximity regarding investing. His research shows that people are more likely to invest in stocks that are local. To emphasise this, one investment manager said “*...you buy your milk at your local grocery store*”.

### 5.2.4 Is the inflation target valid?

The short explanation for why Paul Krugman and Lars Svensson were protesting the monetary policies conducted by the Riksbank, is spelled *deflation*. In an email to Bloomberg, Mr Svensson states that the actions of the Riksbank during the early 2010s could have lead Sweden

[31] Real interest rate is defined as the nominal rate cleared from inflation

[32] A side note is that one of the investment managers states that almost the majority of the CAPEX investments their portfolio companies are making is related to digitalization.

into a low-inflation/deflation trap (Carlstrom, 2015). Krugman uses Sweden as a cautionary tale when discussing what the Federal Reserve[33] should do (2014b). Even IMF is worried about deflation. They state in a report (Faruqee et. al., 2014) that *"...new risk stems from very low inflation in the euro area, where long-term inflation expectations might drift down, raising deflation risks in the event of a serious adverse shock to activity*" (p. 1). When the Riksbank lowered the repo rate to 0% October 28, 2014 Financial Times wrote about it with the poignant headline *"Lars Svensson: 1, Sadomonetarists: 0*" (2014). In the eyes of the world, Svensson was vindicated.

Despite committing to an expansionary monetary policy, the Riksbank has not reached the inflation target. Given this it is interesting to reflect on Johan Grip's findings mentioned in *3.1 Monetary policy and its consequences*, the desired effects of lowering repo rate could be delayed up to eight years (Grip, 2014).

When discussing the inflation target and dangers of low inflation, Dr Jörnmark argued that it is more dangerous for an economy to have high inflation. He says that Sweden is potentially in a liquidity trap, as mentioned in chapter *3.1.4 ZIRP and NIRP*. Dr Jörnmark also emphasise the same point as Dr Sandström, namely that Moore's law and globalization is a crucial factor to take into consideration when it comes to the impeded inflation. Regarding the target of 2% inflation, Dr Jörnmark felt that it seemed a bit arbitrary. Moreover, given Wicksell (1936) account of *the natural interest* it is perhaps legitimate to question if the inflation target of 2% is valid.

Goodfriend and King's (2015) first recommendation in their review of Riksbank's monetary policy pertain to both the target and relevance of CPI:

"*The Riksdag, on a recommendation by the Finance Minister, should specify the inflation target, in terms both of its definition and its numerical value, and should delegate that objective to the Board of the Riksbank to achieve. At present, we recommend a target of 2% a year as measured by CPIF. The target should be reviewed every ten years unless the Riksdag legislates to change the target earlier than the next due review date*" (p. 10)

As seen above, the sometime heated debate regarding what the scope of the Riksbank's targets should be is continuously taking place. Should they focus on other parameters of the Swedish economy or just the inflation target? Several of the bankers interviewed in this study argued that when the Riksbank is only focusing on inflation, they do not account for problems in other parts of the economy that a too low repo rate brings. One interviewee posited that perhaps it would have been better to have a slightly higher repo rate in order to keep asset prices from spiralling. Also, this would help maintaining a lower level of aggregated debt, according to the interviewee.

[33] The Federal reserve, or short the Fed, is roughly the equivalent of the Riksbank in the USA.

### 5.2.5 Is NIRP sustainable?

One investment firm cited the "*skyrocketing multiples [for acquiring companies]*"[34] as worrying signs. Another interviewee said they were somewhat worried about the future and they tried to incorporate future risks into their current strategy. However, this investment manager also noted that: *"it is difficult to completely take these risks into account, given that you have to act [i.e. invest] in the environment you are in".*

When asked about the current situation and economic sustainability, all practitioners interviewed mentioned the financial crisis of 07/08. They all saw similarities between the present situation and the one just before the crisis. They were, for the most part, referring to the development on the Swedish housing market.

There is however another similarity between the financial crisis of 07/08 and the current situation on the corporate side in Sweden, and that is the potential for *malinvestment*. Malinvestment refers to badly allocated investments (Sechrest, 2006). They are a product of misleading relative price signals. Ludwig von Mises[35] wrote about malinvestment in his book *Human Action* (1998):

*"...a credit expansion which first affects the loan market. In this case the inflationary effects are multiplied by the consequences of capital malinvestment and overconsumption. Overbidding one another in the struggle for a greater share in the limited supply of capital goods and labor, the entrepreneurs push prices to a height at which they can remain only as long as the credit expansion goes on at an accelerated pace. A sharp drop in the prices of all commodities and services is unavoidable as soon as the further inflow of additional fiduciary media stops*" (p. 567)

It is not a wide stretch of the imagination to say that above quote describes the case of the financial crisis of 07/08. The housing market leading up to the financial crisis, had a mismatch in pricing due to the perceived low price of debt (O'Driscoll, 2009). When the real price of the debt came apparent to the debtor, a mass default of loans occurred.

Perhaps, the quote of von Mises also reflects the state of corporate financing in Sweden 2017[36]: The expansion of debt; the increase of the debt-to-EBITDA ratio in LBOs. Furthermore, the rapid growth of covenant-light funding all bears the hallmarks of the von Mises quote above. When the interest rates rise to a higher level, many investments may become unprofitable.

[34] Referring to the multiple of EBITDA and ratio debt-to-EBITDA used in chapter 5.

[35] von Mises was very much inspired by Knut Wicksell's theory on business cycles. Also the Keynesian view on economics took much influence from Wicksell.

[36] Anecdotal evidence from one interview with an investment firm: almost as an afterthought one investment manager tries to explain the difference between the venture capital market in Stockholm and Sweden's second largest city Gothenburg. The person says that it is more common with business-to-consumer startups in Stockholm, and business-to-business in Gothenburg. At one time the hottest prospect in Gothenburg was an electric bike and at the same time it was a novelty product, some kind intimacy deodorant, in Stockholm. The malinvestment lead to that the venture capitalist flocked to the idea of the deoderant. It later defaulted having achieved naught.

Investment firms refinancing the leverage could pose a major problem to their capability of delivering the sought yields to their clients and shareholders. This could lead to a change in the sentiment in many investments, and potentially a need for revaluations. As all the investment managers said in chapter *4.3.2* - this would lead to a slowdown, or potentially freeze the transaction market. Based on the discussion above, hypothesis 6, 7 and 8 can be postulated:

**Hypothesis 6: If the repo rate is increased too quickly, the transaction market will slow down due to increased cost of debt and/or decreased valuations.**

**Hypothesis 7: If the transaction market freezes, the investments leveraged with zero-rate debt that matures will have their yields undercut.**

**Hypothesis 8: By diminishing the cost of debt and increasing corporate risk-taking, ZIRP and NIRP have contributed to an increase in systemic risk.**

What has become quite clear from the interviews and the literature, is that discussions about economic sustainability must be done by looking at the economy as a whole. This study was primarily concerned with corporate financing decisions. It was also mostly focusing on publicly traded companies, or companies owned by an investment firm. This is a narrow subset as most companies in Sweden are not publicly traded. As seen in the analysis, roughly 99.9% of Swedish companies are private. Undoubtedly, there is a need for future research on:

- the effects of ZIRP and NIRP on smaller companies;
- consumer behavior and its effects on economic sustainability;
- the levels of debt of households and the housing market which is of great concern to the Riksbank and many of the interviewees.

In chapter 6 *Discussion*, the findings and hypotheses will be discussed.

# 6 DISCUSSION

In this section, the summarised impression regarding the impact of ZIRP and NIRP on corporate financing strategies, and the economy is discussed. Moreover, "worst case scenarios" are discussed and how the credit expansion could pose a threat to the Swedish economy. Important to note is that the scope of this study limits the possibility of making a generalizable conclusion regarding the potential impact of ZIRP and NIRP on economic sustainability. As a result, we, the authors, urge for more research in the subject to provide more definitive answers to our questions. Research hopefully spurred on by this thesis.

Considering the information gathered from the interviews, reports and the data, it is relatively clear that the impact of ZIRP and NIRP is far from insignificant. Taking all results into consideration, it is clear that corporate financing decisions in fact have been affected by ZIRP and NIRP.

- It is hard to discern if the capital structure has changed significantly as a result of ZIRP and NIRP. However, the types of debt companies choose to finance their investments has been affected in a significant manner.
- Companies have taken on riskier debt, which became apparent when analysing the interviews and studying the capital market.
- As companies strive for covenant-light alternatives, the market for corporate bonds has increased. This is a result of the increasing amount of regulations in the financial sector.

The analysis of companies' capital structure in this study is inconclusive, since it is not clear if capital structures have changed to a significant degree as a result of ZIRP and NIRP. However, it is safe to assume, based on the research and interviews, that they in some way have. The expected decrease of solvency could be observed amongst the publicly traded small-cap companies. Apart from these, it is unclear how other listed companies have been affected by the policies.

Although the debt-to-equity ratio has not been affected at a large degree, the investment managers implied that they have noticed an increase in leverage. There is cause for concern about the possible negative effects of a rising repo rate. A potential rise will consequently affect all underlying interest rates, and steepen the yield curve. Estimating what rate will cause a fundamental impact is complex - could it be 0, 2%, or 5%? It is not hard to imagine the negative chain reactions a transaction slowdown could bring. Moreover, a dramatic decrease of valuations could have severe negative effects on the market. As the EQT manager Thomas von Koch said to Bloomberg: "*The storm will come"*. Von Koch is in effect stating that it is time to prepare for a coming negative impact on the economy.

The high leverage can potentially pose a systemic risk, as discussed in chapter 3.4 *Economic Sustainability.* The risk is accentuated by soaring valuation multiples for acquiring (MacArthur et al, 2017), which has been exacerbated by "...*stores of dry powder and cheap debt".* This has

created an environment where investment firms are increasingly hesitant of investing. For instance, during the writing of this thesis, the CEO of Berkshire Hathaway *and* von Koch at EQT, made public statements regarding the amount of leverage in the system. They found the increased amount of leverage staggering, and that the high valuations are making these investors reluctant to invest.

**The risk of extensive leverage**

If the hypotheses H6[37], H7[38] and H8[39] are true and the transaction market freezes, what will happen to the capital invested in investment firms? If these firms decide to hold on to their investments, until the expected ROI is reached, what happens to the money that clients, such as mutual pension funds, provided? Pension funds have a fiduciary responsibility to provide an expected dividend to their primary beneficiaries – the public. If these funds are denied access to their invested capital, it could have far reaching consequences outside the corporate sector.

On the other hand, what if pension funds *force* the investment firms to sell *before* the market has bounced back. How does the leverage that, according to several investment managers and the report by Bain & Co (MacArthur et al, 2017) makes up around 80% of the investments, affect the situation then? Selling before the valuations are at the required level could erase a vast amount of capital in the economy. If an investment firm sells a heavily leveraged holding at such a loss that their capitalization is not sufficient to cover the debt, they will default. Furthermore, this loss will move upstream towards the banks, and eventually to the public, i.e. the taxpayers.

**The strive for covenant-light alternatives**

When analysing why the use of PIK-loans and similar types of debt has increased, we must first consider the present situation, where almost all kinds of debt taken on by companies has, in general, a very low interest rate. In today's monetary climate, the differences between different types of debt does not revolve around the interest rate, to the same extent as before. The credit expansion has formed a market where the competition lies in providing other benefits for the debtor. Most importantly, flexibility and safety to the debtor though covenant light loans. As elaborated in 3.3.1, common bank loans, i.e. loans of senior type, comes with more obligations and stricter regulations. Concluded from the result of this study, this is the core reason to why the corporate bond market has grown in such a rapid pace during ZIRP and NIRP.

PIK-loans and mezzanine funding are also used in greater extend to provide leverage. What impact does this have on economic sustainability? What happens if the scenario like the one

[37] Hypothesis 6: If the repo rate is increased too quickly, the transaction market will slow down due to increased cost of debt and/or decreased valuations

[38] Hypothesis 7: If the transaction market freezes, the investments leveraged with zero-rate debt that matures will have their yields undercut.

[39] Hypothesis 8: By diminishing the cost of debt and increasing corporate risk-taking, ZIRP and NIRP have contributed to an increase in systemic risk.

above, where the transaction market slows down and valuation multiples fall, coincides with the maturity of these loans? And how will this affect the financial market? Investment firms may not be able to pay their interests, and default due to malinvestments. The lower priority of these types of debt could lead to them not being paid back to the creditor. This could cause a domino effect, where the creditors need to write off the debt, and thereby erase a vast amount of capital from the system.

To summaries: asset prices have increased in an alarming pace; valuation multiples have reached unreasonable levels; and the degree of leverage often exceeds enterprise value. The question is: Has ZIRP and NIRP inflated an asset bubble? If so, what happens when it bursts?

# 7 CONCLUSION

This study aimed to investigate how ZIRP and NIRP has affected companies' financial decisions, regarding debt and capital structure, and risk-taking. Almlöf, Hafdell and Fröding (2016) investigated a similar subject and found no correlation between repo rate and capital structure. They urged future researchers to do a qualitative analysis to complement their work, which this study includes. This study gives some support to the idea that the capital structure of smaller firms has been affected by the low interest rate environment. Additionally, the study includes an analysis of the monetary policy's' effect on economic sustainability.

In addition, the result of this study supports several of the hypotheses suggested in the thesis by Severin and Rademark (2006). For instance, that interest rate is a major factor to consider when taking on debt. More importantly, this study also confirms their other hypothesis "*The capital structure theories address mere factors in capital structure decisions, and not the actual reasoning behind these factors".* Important to note is that rather than interviewing CFOs like they did, this study expands upon their study by taking the perspective of bankers, investment firms and academics into account. Moreover, a central theme in this thesis is the current monetary policy's effect on economic sustainability.

Inspired by the work of Severin and Rademark, the conclusion below is presented in the form of eight new hypotheses.

*Chart 7.1: List of hypotheses.*

| The effects of NIRP and ZIRP on company investment: eight hypotheses | |
|---|---|
| **Hypothesis 1** | The credit expansion is partially explained by ZIRP and NIRP. |
| **Hypothesis 2** | ZIRP and NIRP are in part responsible for today's record high corporate valuations. |
| **Hypothesis 3** | The high yield corporate bond market has grown, and other types of high risk loans have become more common, as a result of stricter regulations in combination with ZIRP and NIRP. |
| **Hypothesis 4** | Firm size is a moderating variable of the relationship between a firm capital structure and repo rate. |
| **Hypothesis 5** | Investment managers do not reason as the Pecking Order Theory or the Trade-Off Theory of capital structure would predict |
| **Hypothesis 5a** | Investment managers do not think in terms of optimising capital structure, even when quantitative data suggest that they do. |
| **Hypothesis 5b** | The major reason practitioners give for a pecking order is capital cost, rather than information asymmetries. |
| **Hypothesis 6** | If the repo rate is increased too quickly, the transaction market will slow down due to increased cost of debt and/or decreased valuations |
| **Hypothesis 7** | If the transaction market freezes, the investments leveraged with zero-rate debt that matures will have their yields undercut. |
| **Hypothesis 8** | By diminishing the cost of debt and increasing corporate risk-taking, ZIRP and NIRP have contributed to an increase in systemic risk. |

To conclude, we urge other researchers and students to investigate the hypotheses above. Further research is needed to elucidate the relationship between repo rate and the investment decisions of unlisted and smaller companies. Odit and Gobardhun (2011) have begun some of this work. They cite Zingales (2000) who put it well: *"empirically, the emphasis on large firms has led us to ignore (or study less than necessary) the rest of the universe: the young and small firms, who do not have access to public markets".*

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# APPENDIX A - DESCRIPTION OF THE PEOPLE THAT PARTOOK IN THE STUDY

**Maxine Rior**

Maxine Rior has studied Industrial Engineering and Management at Lund University. She is working as a financial advisor within the Corporate Finance division at Danske Bank in Stockholm. She primarily works on the "sell-side" in M&As and takes an active part in the launching process of IPOs. Maxine's background in Corporate Finance and wide range of clients in different sectors makes her perspective valuable for this study.

**Erik Mårtensson**

Erik Mårtensson has studied Industrial Engineering and Management at Chalmers University of Technology. Previously, he worked as an internal consultant at Danske Bank in Copenhagen, but later transferred to Stockholm. Today he is part of the Leveraged Finance team, and advises primarily PE-firms and venture capital funds on their debt compositions when, for instance, acquiring other companies. As Erik offers the "buy-side" view, he makes a valuable interviewee for this thesis.

**Wiveca Swarting**

Wiveca Swarting has studied Finance in USA and National Economics at Lund University. She is currently working as a Financial Analyst within Debt Capital Markets, DCM, at Danske Bank in Stockholm. In her role at DCM, she primarily works with corporate bonds, including bond issuing for corporate and institutional clients. Her perspective on capital markets, particularly the corporate bond market, makes her highly relevant as an interviewee for this report.

**Kristoffer Svensson**

Kristoffer Svensson has studied Economics at Lund University and is currently working as a Sales Manager in the Markets division at Nordea in Stockholm. He specialises in currency risk, but has worked in various positions within the bank. His experience and knowledge about financial markets, currency risk, and market risk in general, is highly relevant for this study.

**Adam Lidén**

Adam Lidén has studied Finance at Lund University and is today a Risk Advisor in the Markets division at Nordea in Stockholm, specialising in interest rate risk. He primarily constructs hedging strategies for larger companies and advise on how they should manage debt. His perspective on risk management, in particular interest rate risk, and knowledge about financial markets makes him valuable as an interviewee for this thesis.

**Rickard Talling**

Rikard Talling has studied Law and Business Administration at Uppsala and Stockholm University. Rikard is currently working as a Director within Capital Markets, Structured Finance, at Swedbank. In Rikard's role at Structured Finance, Rikard primarily works with acquisition financing for private equity customers, originating senior loans for the bank. Rikard's perspective on capital structures, particularly the relationship between senior and junior loans and different political decisions on risk appetite within leveraged finance, makes Rikard highly relevant as an interviewee for this study.

**Taylan Mavruk**

Taylan Mavruk is a senior lecturer and Assistant Professor of Business Administration at University of Gothenburg. He is part of the Industrial and Financial Management Group. Mr Mavruk studies the fields of empirical portfolio choice; biases in investing, primarily local and home biases; risk-taking behaviour of mutual fund managers.

**Christian Sandström**

Christian Sandström is an associate professor at Chalmers University of Technology. His primary research interest is innovation and digitalization. He teaches macroeconomics and innovation economics. His knowledge about digitization gives a unique perspective on inflation and economic sustainability.

**Jan Jörnmark**

Jan Jörnmark is an economic historian that has written much about the housing market and housing bubbles. As a historian, he is in a unique position to discuss the effects of inflation and repo rates. He was included to give his take on economic sustainability, which is one of the themes of this study.

**Investment firm interviewees: Alpha, Bravo, Charlie**

All of the interviewees from investment firms interviewed wanted to be anonymised. They operate in a world where information is highly proprietary. They didn’t want to risk disclosing confidential information to the public but still “be honest in their answers”. They manage a substantial amount of capital and misdirected information could possibly affect the markets in unpredictable and even negative ways. Therefore, no specifics will be mentioned in this study.

All three of the investment managers have previously worked as consultants. As such they have experience not only on the “buy-side” but also the “sell-side”. They now work at three different investment firms that are predominantly acting on the Swedish market. Seeing as the youngest company was established in 1908, all three companies have long since reached maturity in their respective businesses. Their differences, and what makes them individually interesting are in broad strokes:

- How they raise their money for acquisitions;
- The amount of leverage they use;
- The length of their investments.

Their differences make it possible to contrast the opinions of different types of investment firms.

# APPENDIX B - INTERVIEW QUESTIONS MARKETS

- Berätta lite om din bakgrund ex. utbildning och vilka områden på banken du arbetat inom. Vilken avdelningen arbetar du på nu? Vad har du för roll på banken? Vad fyller din avdelning för funktion? Vilken kundtyp arbetar du vanligtvis med och hur varierande är kundtyperna?
- Vilka är de vanligaste finansieringsaktiviteterna dina kunder vill genomföra (exempelvis förvärv, börsnotering etc.)? Vad är kundens syfte och mål för sin verksamhet med dem?
- Vilka huvudtyper av finansieringslösningar finns det att välja på? Vad innebär dessa? Vilka för/nackdelar finns det med de olika metoderna? I detta avsnitt i rapporten planerar vi att skissa upp ett ”finansieringsträd” som grenar ut sig i de olika sätten, vilka utgår från debt och equity.
    - Vilka finansieringslösningar och belåningsstrukturer är vanligast under högkonjunktur respektive lågkonjunktur? Varför?
    - Vilka finansieringslösningar och strategier har varit vanligast de senaste 5 åren? Har ni märkt av en tydlig trend av en viss typ av finansieringslösningar? Hur har denna trend i så fall förändrats över tid? Hur har belåningsstrukturerna påverkats av ZIRP och NIRP?
    - Vilka faktorer spelar in i beslutsprocessen vid val av finansieringslösning? Varför dessa? Vilka faktorer väger tyngst? Vilka faktorer påverkas mest av penningpolitiken?
    - Har du möjlighet att ge oss ett par exempel på ”source and application”, dvs. vart finansieringarna kommer ifrån och vad de använts till, för transaktioner ni genomfört (som eventuellt uppvisar tydlig variation på finansiering)?
- Från slutet av 2007 till 2015 steg de svenska bolagens skuldsättning med 27 procentenheter av BNP. Vad har dessa pengar främst gått till? Har ”risktagandet” ökat i och med ökad belåning? Hur har era kunders skuldsättningsgrad förändrats som resultat av kreditexpansionen?
- Hur mycket ekonomisk hållbarhet ingår i riskprocessen? (Dvs. hur analyseras risken för framtida förändringar som kan påverka kunden negativt som resultat av skuldstrukturer? Skyddar sig era kunder mot risken för framtida räntehöjningar? I så fall hur?)
    - Har era kunders risktagande påverkats av den ökade tillgängligheten på kapital?
- Vilken roll anser du att den expansiva penningpolitiken (främst NIRP och ZIRP) de senaste 5 åren haft för företags utveckling och vad anser banken om penningpolitiken? Vad anser era kunder?
- Anser banken att den expansiva penningpolitiken varit bra för svenska företag? Varför/varför inte? Vad anser kunderna själva? Har era kunders risktagande, strategier och beteende förändrats under denna period (gällande ex. finansieringslösningar, vad man väljer att investera i/satsa på etc.)?

- Ser du några risker för svenska företag som i dagsläget har hög skuldsättningsgrad, om räntan skulle komma att höjas relativt snabbt? Hur tror du kreditmarknaden ser ut om 5–10 år?

# APPENDIX C - INTERVIEW QUESTIONS CORPORATE AND LEVERAGED FINANCE

- Berätta lite om din bakgrund ex. utbildning och vilka områden på banken du arbetat inom. Vilken avdelningen arbetar du på nu? Vad har du för roll på banken? Vad fyller din avdelning för funktion? Vilken kundtyp arbetar du vanligtvis med och hur varierande är kundtyperna?
- Vilka transaktioner och placeringar genomför du åt dina kunder? Vad är kundens syfte och mål för sin verksamhet med dem? Vilka typer av transaktioner/placeringar har varit vanligast de senaste 5 åren (ex. företagsobligationer, företagscertifikat, fixed/floating etc.)?
    - I hur stor grad påverkar reporäntan val av transaktioner och placeringar?
    - Varierar era kunders strategier och risktagande beroende på högkonjunktur respektive lågkonjunktur? I så fall hur? Har du sett någon förändring/trend de senaste åren som resultat av den ökade tillgängligheten på kapital?
    - Vilka riskfaktorer tar du hänsyn till vid olika typer av transaktioner och placeringar? Hur mycket ekonomisk hållbarhet ingår i era riskanalyser? (Dvs. hur analyseras risken för framtida förändringar som kan påverka kunden negativt som resultat av skuldstrukturer? Hur skyddar sig era kunder mot risken för framtida räntehöjningar?)
- Har den expansiva penningpolitiken (NIRP och ZIRP) som förts de senaste 5 åren gjort sig märkbar? Om ja, vilka effekter har du uppmärksammat? Några speciellt utmärkande? När och hur?
    - Från slutet av 2007 till 2015 steg de svenska bolagens skuldsättning med 27 procentenheter av BNP. Vad har dessa pengar främst gått till? Har ”risktagandet” ökat i och med ökad belåning? Hur har era kunders skuldsättningsgrad förändrats som resultat av kreditexpansionen?
    - Joachim Andersson på Nordea C&IB har uttryckt ”Vi befinner oss i en högkonjunktur av IPOs.” Likaså har företagsförvärv blomstrat de senaste åren. I hur stor grad tror du penningpolitiken gjort detta möjligt? Vilka andra faktorer kan också ha gynnat dessa marknader?
    - Anser banken att den expansiva penningpolitiken de senaste 5 åren varit bra för svenska företag? Varför/varför inte? Vad anser kunderna själva? Har era kunders risktagande, strategier och beteende förändrats under denna period (gällande ex. finansieringslösningar, vad man väljer att investera i/satsa på etc.)?
- Vad tror du de senaste årens penningpolitik gett för budskap till svenska företag och era kunder? Är politiken hållbar i längden? Vad bygger den upp för förhoppningar och framtidsutsikter?
- Ser du några risker för svenska företag som i dagsläget har hög skuldsättningsgrad, om räntan skulle komma att vända relativt snabbt? Hur tror du kreditmarknaden ser ut om 5-10 år?

# APPENDIX D - INTERVIEW QUESTIONS INVESTMENT FIRMS

**Finansieringsstrategier: kapitalstruktur, skuld sammansättning och risk**

- Kan ni kortfattat beskriva PE:s funktion inom ekonomin.
- Vad ser ni har varit syftet med den penningpolitik som bedrivits de senaste 5 åren?
    - Har målet nåtts?
    - Varför/varför inte?
    - Vad anser ni som PE bolag?
    - Vad anser era portföljbolag?
- Har penningpolitiken (framförallt NIRP och ZIRP) gjort sig märkbar?
    - Om ja, vilka effekter har ni sett/märkt av?
    - Några speciellt utmärkande?
    - När och hur?
- Anser ni att penningpolitiken varit bra för svenska företag?
    - Varför/varför inte?
    - Vad anser era portföljbolag?
- Har finansieringslösningar förändrats de senaste 5 åren som resultat av den förda penningpolitiken?
    - Har kapitalstrukturen (skuldsättningsgraden) förändrats som resultat av den låga reporäntan?
    - Hur resonerar ni kring valet av kapitalstruktur och skuldsammansättning?
    - Mer?
- Vilka är de vanligaste investeringarna som ni gör?
    - Vilken typ är de vanligaste för era portföljbolag?
    - Vilka finansieringslösningar har varit vanligast de senaste 5 åren?
    - Har det skett ett skifte?
- Vilka faktorer tar ni med när ni bestämmer finansieringslösningar för investeringar?
- Har era avkastningskrav förändrats?
    - Vad beror det på?
- Vilka branscher letar ni inom nu?
- Vilket mått använder ni på riskfri ränta? CAPM?
- Era portföljbolag ökar de sina investeringar?
    - RnD eller materiella?
- Hur ser er investeringsstrategi ut?
- Hur arbetar ni med skuld?
    - Hur arbetar era ägda bolag?
    - Banklån vs företagsobligationer

**Ekonomisk hållbarhet:**

- Från slutet av 2007 till 2015 steg de svenska bolagens skuldsättning med 27 procentenheter av BNP:

    - Varför så mycket?
    - Har risktagandet förändrats?
- Hur ser framtiden för svenska företag som i dagsläget har hög skuldsättningsgrad, om räntan stiger?
    - Märker ni någon skillnad i strategier beroende på räntan?
    - Vad tror ni om framtiden?
    - Har NIRP och ZIRP påverkat svenska företags risktagande?
- Vad tror ni de senaste årens penningpolitik gett för budskap till svenska företag?
    - Är den hållbar i längden?
    - Vad bygger den upp för förhoppningar och framtidsutsikter?

# APPENDIX E - INTERVIEW QUESTIONS ACADEMICS

**Finansieringsstrategier: kapitalstruktur, skuld sammansättning och risk**

- Kan du kort beskriva ditt forskningsområde.
- Vad ser du syftet har med den penningpolitik som bedrivits de senaste 5 åren?
    - Har målet nåtts?
    - Varför/varför inte?
- Har penningpolitiken (framförallt NIRP och ZIRP) gjort sig märkbar?
    - Om ja, vilka effekter har ni sett/märkt av?
    - Några speciellt utmärkande?
    - När och hur?
- Anser du att penningpolitiken varit bra för svenska företag?
    - Varför/varför inte?
    - Vilka är vinnare?
    - Vilka är förlorare?
- Har finansieringslösningar förändrats de senaste 5 åren som resultat av den förda penningpolitiken?
    - Har kapitalstrukturen (skuldsättningsgraden) förändrats som resultat av den låga reporäntan?
    - Har skuldsammansättningen förändrats som resultat av den låga reporäntan?
    - Hur ser du att företag resonerar kring valet av kapitalstruktur och skuldsammansättning?
    - Mer?

**Ekonomisk hållbarhet:**

- Från slutet av 2007 till 2014 steg de svenska bolagens skuldsättning med 27 procentenheter av BNP
    - Varför så mycket?
    - Har risktagandet förändrats?
- Hur ser framtiden ut för svenska företag som i dagsläget som har hög skuldsättningsgrad, om räntan stiger?
- Har NIRP och ZIRP påverkat svenska företags risktagande?
- Vad tror du de senaste årens penningpolitik gett för budskap till svenska företag?
    - Är den hållbar i längden?
    - Vad bygger den upp för förhoppningar och framtidsutsikter?
- Hur anser du Riksbanken bör agera framgent?
- Någon till forskare du kan rekommendera oss att intervjua?
- Någon annan fråga som du skulle vilja att vi frågade dig?

# APPENDIX F – SOLVENCY DATA

| Year | Large cap | Mid cap | Small cap | First North |
|---|---|---|---|---|
| **2007** | 40.9 | 55.6 | 51.1 | |
| **2008** | 39.2 | 55.6 | 52.1 | |
| **2009** | 42.2 | 58.3 | 54.2 | |
| **2010** | 42.5 | 56.8 | 52.8 | |
| **2011** | 41.3 | 55.8 | 53.0 | |
| **2012** | 39.9 | 53.1 | 51.1 | 49.8 |
| **2013** | 39.5 | 51.6 | 50.9 | 51.5 |
| **2014** | 39.8 | 50.3 | 51.2 | 54.0 |
| **2015** | 41.0 | 53.0 | 49.6 | 54,6 |
| **2016** | 41.8 | 52.8 | 49.1 | 55.8 |

Solvency averages (%) for large cap, mid cap, small cap and first north. Computed from a set of 498 companies.

# APPENDIX G – RIKSBANK REPO RATE

| Riksbank prime rate (weighted average) | |
|---|---|
| 2017 | −0,5 |
| 2016 | −0,4973972603 |
| 2015 | −0,2643835616 |
| 2014 | 0,4219178082 |
| 2013 | 0,9904109589 |
| 2012 | 1,454794521 |
| 2011 | 1,754109589 |
| 2010 | 0,4691780822 |
| 2009 | 0,6623287671 |
| 2008 | 4,125342466 |
| 2007 | 3,462328767 |
| 2006 | 2,054794521 |

(Riksbanken, n.d.e

# APPENDIX H - NASDAQ STOCKHOLM SOLVENCY LARGE-CAP

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| AarhusKarlshamn | 27,58 | 21,51 | 34,64 | 34,46 | 35,74 | 40,19 | 43,44 | 46,36 | 47,86 | 44,09 |
| ABB | 35,34 | 35,65 | 41,68 | 42,59 | 41,2 | 35,55 | 39,96 | 37,47 | 36,24 | 35,31 |
| Ahsell | | | | | | 4,23 | 3,55 | 3,38 | 3,04 | 34,17 |
| Alfa Laval | 34,14 | 36,14 | 46,66 | 49,99 | 43,89 | 43,86 | 46,26 | 30,84 | 35,5 | 37,99 |
| Assa Abloy | 41,52 | 41,9 | 45,37 | 45,87 | 42,86 | 44,65 | 43,81 | 45,12 | 48,25 | 49,56 |
| AstraZeneca | 31,08 | 34,21 | 37,91 | 41,71 | 44,43 | 44,74 | 41,6 | 33,53 | 30,78 | 26,66 |
| Atlas Copco A | 25,84 | 31,53 | 37,82 | 40,94 | 38,4 | 43,29 | 45,28 | 48,21 | 45,38 | 45,88 |
| Atrium Ljungberg | 45,35 | 42,22 | 42,43 | 42,9 | 41,17 | 40,27 | 41,08 | 39,59 | 43,67 | 43,72 |
| Attendo | | | | -5,83 | -6,34 | 33,06 | 25,29 | 26,33 | 45,43 | 48,6 |
| Autoliv | 44,28 | 41,76 | 46,98 | 51,89 | 54,75 | 57,47 | 57,29 | 46,25 | 46,08 | 47,68 |
| Avanza | 3,97 | 3,99 | 2,49 | 2,02 | 2,21 | 1,83 | 1,4 | 1,21 | 1,27 | 1,3 |
| Axfood | 32,57 | 30,73 | 36,73 | 38,78 | 39,1 | 39,8 | 42,58 | 41,94 | 43 | 39,07 |
| Axis | 60,3 | 51,34 | 54,4 | 49,04 | 47,51 | 45,25 | 48,22 | 49,72 | 58,06 | 58,67 |
| Betsson | 73,91 | 62,71 | 58,94 | 55,49 | 58,7 | 53,36 | 57,8 | 61,34 | 55,06 | 55,93 |
| BillerudKorsnäs | 31,49 | 29,24 | 43,99 | 50,4 | 52,19 | 38,39 | 40,84 | 41,64 | 49,51 | 50,37 |
| Boliden | 47,49 | 53,32 | 48,88 | 53,65 | 55,91 | 57,32 | 55,15 | 54,65 | 59,99 | 54,56 |
| Bonava B | | | | | | | 3,68 | 2,15 | 30,52 | 33,7 |
| Bravida | 20,85 | 22,31 | 28,24 | 27,09 | 35,83 | 22,22 | 34,68 | 29,88 | 31,2 | 34,1 |
| Castellum | 40,17 | 34,18 | 32,88 | 34,7 | 32,79 | 32,94 | 34,44 | 35,84 | 36,97 | 37,33 |
| Collector | | | | | | 14,16 | 13,27 | 15,17 | 16,4 | 16,93 |
| Com Hem | | | | | | 0,37 | -3,44 | 38,64 | 35,42 | 28,57 |
| Dometic | | | | | | | 34,47 | 33,87 | 59,54 | 62,65 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Electrolux B | 24,27 | 22,35 | 25,92 | 28,04 | 27,03 | 26,03 | 18,83 | 19,22 | 17,98 | 20,66 |
| Elekta | 28,68 | 32,13 | 38,1 | 42,77 | 32,88 | 34,1 | 34,97 | 31,37 | 32,98 | 32,62 |
| Ericsson B | 55,1 | 49,73 | 52,27 | 52,09 | 51,82 | 50,36 | 52,61 | 49,5 | 51,82 | 49,58 |
| Fabege | 35,95 | 32,33 | 32,48 | 38,53 | 38,72 | 33,83 | 35,42 | 38,27 | 39,47 | 45,8 |
| Fast Balder | 30,14 | 23,33 | 24,08 | 30,92 | 35,19 | 34,76 | 37,27 | 35,49 | 34,14 | 36,15 |
| Fingerprint Cards | 90,76 | 84,23 | 88,74 | 92,49 | 91 | 88,45 | 87,07 | 70,91 | 60,04 | 63,55 |
| Getinge | 28,81 | 32,32 | 33,5 | 38,31 | 35,29 | 35,41 | 37,38 | 35,39 | 36,8 | 37,88 |
| Handelsbanken A | 4,01 | 3,47 | 3,91 | 4,1 | 3,85 | 4,48 | 4,47 | 4,5 | 5,09 | 5,19 |
| Hemfosa | | | | | | 13,02 | 13,84 | 33,85 | 34,18 | 41,22 |
| Hennes & Mauritz | 72,11 | 74,71 | 74,64 | 73,28 | 72,85 | 68,9 | 68,2 | 67,65 | 62,12 | 64,83 |
| Hexagon | 40,28 | 43,69 | 49,1 | 43,39 | 47,27 | 51,01 | 52 | 50,94 | 55,2 | 58,01 |
| Holmen B | 50,93 | 45,2 | 51,29 | 50,59 | 53,13 | 56,18 | 56,74 | 57,55 | 58,81 | 60,88 |
| Hufvudstaden A | 56,37 | 55,91 | 54,98 | 56,12 | 55,02 | 58,85 | 57,64 | 58,75 | 60,54 | 61,12 |
| Husqvarna B | 25,65 | 25,67 | 40,11 | 42,97 | 42,57 | 41,34 | 42,56 | 41,47 | 44,02 | 43,56 |
| ICA Gruppen | 94,38 | 94,95 | 89,77 | 85,05 | 85,62 | 86,07 | 38,49 | 38,53 | 37,48 | 39 |
| Industrivärden C | 65,55 | 79,09 | 78,73 | 68,53 | 70,52 | 74,52 | 80,19 | 82,21 | 85,89 | 87,9 |
| Indutrade | 36,35 | 36,2 | 41,11 | 36,39 | 37,77 | 35,04 | 37,76 | 39,1 | 39,6 | 39,8 |
| Intrum Justitia | 34,16 | 35,53 | 37,49 | 36,21 | 35,58 | 35,23 | 32,44 | 26,81 | 26,07 | 28,67 |
| Investor B | 87,57 | 81,92 | 83,81 | 77,03 | 73,37 | 76,25 | 80,84 | 80,68 | 80,8 | 81,13 |
| JM | 39,26 | 32,23 | 36,94 | 39,65 | 40,7 | 40,39 | 39,96 | 37,45 | 37,76 | 39,67 |
| Kindred Group | 45,12 | 44,28 | 57,7 | 64,94 | 68,21 | 63,84 | 67,67 | 70,35 | 53,34 | 53,97 |
| Kinnevik B | 80,02 | 65,6 | 78,28 | 83,95 | 85,18 | 93,63 | 96,91 | 97,84 | 97,89 | 97,46 |
| Klövern A | 37,42 | 32,29 | 32,72 | 32,09 | 30,8 | 27,64 | 28,53 | 31,55 | 31,74 | 32,07 |
| Kungsleden | 27,58 | 23 | 29,24 | 30,04 | 27,29 | 36,97 | 36,8 | 39,51 | 33,14 | 36,75 |
| Latour | 74,82 | 73,05 | 80,66 | 83,49 | 77,14 | 77,43 | 75,31 | 70,47 | 75,58 | 80,34 |
| Lifco | | | | 28,48 | 34,59 | 34,56 | 43,56 | 46,71 | 49,19 | 46,98 |
| Loomis | 18 | 33,39 | 38,38 | 41,19 | 37,46 | 40,01 | 44,94 | 37,67 | 40,53 | 44,7 |
| Lundbergföretagen | 34,37 | 28,7 | 34,81 | 37,08 | 36,25 | 39,75 | 41,28 | 42,73 | 44,14 | 46,75 |
| Lundin Mining | 75,18 | 70,29 | 77,94 | 82,42 | 85,34 | 87,09 | 82,8 | 63,31 | 62,65 | 59,06 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Lundin Petroleum | 52,5 | 50,74 | 41,93 | 41,08 | 39,79 | 37,95 | 28,96 | 9,15 | -9,91 | -6,77 |
| Melker Schörling | 94,24 | 73,84 | 81,86 | 81,41 | 85,89 | 93,26 | 95,43 | 97,25 | 99,93 | 99,96 |
| Millicom | 31 | 31,64 | 38,56 | 34,16 | 33,58 | 28,45 | 22,75 | 28,18 | 35,62 | 34,98 |
| MTG B | 53,61 | 46,69 | 38,77 | 44,56 | 38,56 | 43,91 | 37,42 | 41,26 | 28,9 | 28,34 |
| NCC B | 21,24 | 18,94 | 25,64 | 26,14 | 25,2 | 23,07 | 22,36 | 22,74 | 24,65 | 21,99 |
| NetEnt | 54,18 | 71,9 | 69,98 | 65,12 | 53,79 | 52,29 | 71,43 | 67,93 | 74,03 | 69,97 |
| NIBE | 34,21 | 36,7 | 45,69 | 48,22 | 38,22 | 42,57 | 43 | 36,22 | 39,93 | 46,61 |
| Nobia | 40,39 | 36,77 | 37,62 | 40,61 | 41,88 | 40,01 | 43,95 | 40,69 | 47,37 | 47,37 |
| Nokia | 46,11 | 41,71 | 41,27 | 41,49 | 38,44 | 31,54 | 26,44 | 41,16 | 50,16 | 46,71 |
| Nordea | 4,41 | 3,76 | 4,42 | 4,22 | 3,65 | 4,17 | 4,63 | 4,46 | 4,8 | 5,26 |
| Pandox | | | | | | | 24 | 38,12 | 38,63 | 39,7 |
| Peab | 23,49 | 25,15 | 29,3 | 27,82 | 25,35 | 24,9 | 24,07 | 28,17 | 28,8 | 29,68 |
| Ratos B | 37,71 | 40,44 | 41,12 | 40,39 | 36,71 | 39,34 | 41,27 | 46,34 | 46,91 | 44,58 |
| Resurs Bank | | 10,32 | 9,4 | 12,75 | 13,39 | 12,11 | 12,78 | 15,53 | 19,57 | 20,46 |
| Saab | 32,57 | 28,37 | 35,1 | 39,09 | 41,1 | 47,5 | 43,82 | 38,48 | 36,8 | 32,28 |
| Sagax A | 25,8 | 19,31 | 19,95 | 26,18 | 23,18 | 27,57 | 31,87 | 31,6 | 33,52 | 37,69 |
| Sandvik | 34,91 | 35,58 | 32,71 | 37,57 | 34,32 | 34,82 | 35,8 | 34,49 | 33,64 | 37,96 |
| SCA B | 44,32 | 42,31 | 45,31 | 47,43 | 44,09 | 45,74 | 46,6 | 47,09 | 49,68 | 47,98 |
| SEB A | 3,27 | 3,33 | 4,32 | 4,25 | 3,99 | 3,84 | 4,94 | 5,1 | 5,72 | 5,38 |
| Securitas | 22,49 | 23,82 | 26,9 | 27,18 | 25,11 | 22,36 | 25,19 | 27,5 | 30,82 | 29,97 |
| Skanska | 26,25 | 23,06 | 25,13 | 26,76 | 23,66 | 21,93 | 24,38 | 23,07 | 24,78 | 25,83 |
| SKF B | 39,62 | 35,1 | 35,83 | 36,57 | 37,82 | 36,98 | 29,8 | 29,89 | 32,96 | 32,99 |
| SSAB A | 32,13 | 50,82 | 51,31 | 49,17 | 48,5 | 49,08 | 48,54 | 48,9 | 52,19 | 58,23 |
| Stora Enso R | 49,3 | 46,16 | 44,7 | 47,98 | 45,85 | 42,91 | 41,34 | 40,76 | 44,6 | 47,61 |
| Sweco B | 38,98 | 46,96 | 50,64 | 47,84 | 46,17 | 36,56 | 27,14 | 31,9 | 38,49 | 39,33 |
| Swedbank | 4,25 | 4,77 | 5,01 | 5,54 | 5,28 | 5,75 | 6,03 | 5,53 | 5,74 | 6,02 |
| Swedish Match | 4,4 | 7,52 | 5,53 | -3,27 | -11,02 | -14,27 | -5,28 | 1,68 | 1,7 | -8,81 |
| Swedish Orphan Biovitrum | 74,58 | 49,83 | 48,22 | 61,42 | 74,09 | 76,57 | 73,16 | 71 | 56,42 | 53,68 |
| Tele2 B | 55,19 | 59,83 | 70,49 | 71,53 | 46,12 | 41,53 | 54,17 | 56,92 | 49,52 | 44,95 |
| Telia Company | 58,63 | 53,52 | 52,84 | 52,95 | 48,85 | 44,58 | 44,67 | 42,77 | 40,23 | 37,43 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Thule | | | | | 18,16 | 20,15 | 22,43 | 42,66 | 46,79 | 48,53 |
| Tieto | 37,23 | 38,55 | 43,36 | 44,94 | 44,13 | 46,92 | 46,91 | 45,68 | 44,45 | 45,43 |
| Trelleborg | 34,27 | 30,32 | 41,85 | 44,65 | 47,07 | 52,19 | 54,52 | 53,76 | 54,15 | 51,99 |
| Volvo B | 25,74 | 22,73 | 20,17 | 23,31 | 24,26 | 25,66 | 22,44 | 20,91 | 22,88 | 24,51 |
| Wallenstam | 41,81 | 39,65 | 36,99 | 37,41 | 35,54 | 38,1 | 39,58 | 40,57 | 43,64 | 45,14 |
| Wihlborgs | 32,62 | 29,44 | 29,58 | 30,47 | 30,14 | 30,05 | 29,87 | 28,23 | 30,57 | 34,31 |
| ÅF | 47,9 | 47,05 | 50,98 | 59,76 | 59,42 | 45,52 | 51,94 | 54,15 | 50,86 | 45,13 |

# APPENDIX I - NASDAQ STOCKHOLM SOLVENCY MEDIUM-CAP

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| AcadeMedia | 41,57 | 35,78 | 42,22 | 48,59 | 33,74 | 31,16 | 30,57 | 31,78 | 41,49 | 41,63 |
| Acando | 60,04 | 63,64 | 69,28 | 71,26 | 68,59 | 69,98 | 66,19 | 59,39 | 66,26 | 67,65 |
| AddLife | | | | | | | | | 40,93 | 45,47 |
| Addnode | 58,68 | 60,49 | 65,94 | 62,23 | 64,02 | 59,39 | 54,08 | 56,05 | 48,47 | 48,59 |
| Addtech | 33,65 | 39,29 | 45,17 | 39,93 | 37,23 | 37,17 | 38,93 | 39,94 | 39,79 | 38,62 |
| Africa Oil | | | 94,22 | 95,17 | 90,74 | 92,97 | 94,13 | 83,85 | 90,11 | 97,07 |
| Alimak | | | | | | | 24,62 | 26,56 | 60,99 | 67,22 |
| Alligator Bioscience | | | | | | | | | | |
| Ambea | | | | | | | | 55,68 | 55,77 | 38,15 |
| AQ Group | 50,72 | 58,85 | 62,31 | 56,41 | 62,51 | 54,25 | 56,11 | 62,86 | 57,79 | 59,73 |
| Arcam | 68,03 | 60,63 | 72,85 | 68,04 | 60,34 | 60,23 | 87,22 | 68,69 | 79,68 | 77,9 |
| B&B TOOLS | 26,82 | 29,19 | 32,2 | 34,15 | 35,88 | 40,33 | 43,25 | 45,35 | 51,41 | 50,43 |
| Beijer | 36,62 | 44,62 | 54,3 | 59,43 | 47,83 | 48,22 | 47,31 | 45,95 | 43,61 | 43,28 |
| Beijer Alma | 62,75 | 65,91 | 71,14 | 70,73 | 67,5 | 63,56 | 63,36 | 63,73 | 64,08 | 60,46 |
| Besqab | | | | | 26,73 | 28 | 36,85 | 54,98 | 59,23 | 59,54 |
| Bilia | 21,4 | 22,7 | 30,21 | 34,25 | 32,93 | 30,26 | 29,91 | 26,59 | 27,68 | 24,78 |
| BioGaia | 85,73 | 85,86 | 89,6 | 82,22 | 82,32 | 88,35 | 82,64 | 82,91 | 83,65 | 84,91 |
| Biotage | 80,55 | 86,59 | 88,73 | 81,9 | 80,67 | 81,16 | 80,5 | 81,2 | 81,73 | 81,02 |
| BlackPearl Resources | 84,98 | 87,61 | 91,08 | 87,44 | 87,4 | 87,8 | 85,7 | 81,05 | 78,96 | 84,91 |
| Bufab | | | | 17,46 | 19,47 | 43,43 | 48,82 | 51,67 | 44,59 | 45,44 |
| Bulten | | | | 25,87 | 54,34 | 55,81 | 53,05 | 67,52 | 64,04 | 68,9 |
| Bure Equity | 73,5 | 82,83 | 69,51 | 88,14 | 88,73 | 86,65 | 89,37 | 93,14 | 96,56 | 97,67 |
| Byggmax | | | 21,03 | 45,04 | 47,82 | 49,32 | 49,88 | 49,43 | 48,92 | 35,87 |
| Camurus | | | | | | | | 59,45 | 78,47 | 88,22 |
| Capio | | | | | | 27,93 | 29,98 | 33,38 | 42,56 | 43,66 |
| Catella B | 20,32 | 87,68 | 22,78 | 18,94 | 25,08 | 26,72 | 26,76 | 28,74 | 28,66 | 30,61 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Catena | 39,55 | 33,33 | 34,16 | 38,88 | 41,85 | 52,06 | 32,59 | 32,35 | 35,66 | 31,63 |
| Cavotec | | 46,72 | 49,71 | 52,03 | 50 | 50,7 | 49,52 | 57,03 | 53,8 | 59,71 |
| Clas Ohlson | | 68,41 | 58,07 | 57,9 | 51,47 | 60,32 | 59,09 | 58,34 | 57,33 | 54,52 |
| Cloetta | | 60,84 | 63,88 | 65,68 | 67,55 | 35,61 | 41,68 | 40,63 | 44,51 | 45,46 |
| CLX Communications | | | | | | | | -41,58 | 12,41 | 22,78 |
| Concentric | | | 31,84 | 37,08 | 52,41 | 55,47 | 41,45 | 39,25 | 42,47 | 42,09 |
| Coor Service Management | | | | | | | | 17,95 | 44,68 | 43,92 |
| Corem | 36,66 | 24,87 | 29,52 | 31,97 | 29,17 | 28,59 | 31,1 | 26,77 | 32,13 | 30,29 |
| Creades | | | | | 100 | 98,3 | 89,24 | 90,86 | 94,51 | 94,16 |
| D. Carnegie & Co | | | | | | 78,04 | 71,09 | 25,35 | 28,22 | 33,8 |
| Diös | 31,9 | 26,28 | 27,88 | 28,28 | 22,94 | 25,31 | 26,84 | 27,27 | 27,35 | 30,98 |
| Duni | 40,3 | 40,51 | 51,28 | 57,1 | 56,56 | 58,37 | 56,81 | 50,67 | 56,13 | 55,4 |
| Dustin Group | | | | | | 23,1 | 17,13 | 20,44 | 34,44 | 36,48 |
| East Capital Explorer | 98,44 | 97,91 | 98,33 | 96,09 | 97,19 | 97,52 | 77,19 | 99,85 | 99,8 | 99,29 |
| Elanders | 38,87 | 36,77 | 36,2 | 40,71 | 43,88 | 42,18 | 42,15 | 37,75 | 41,8 | 35,55 |
| Eltel | | | | | | | 29,02 | 25,94 | 40,83 | 32,13 |
| Engelska Skolan | | | | | | 44,03 | 45,45 | 52,82 | 61,78 | 62,61 |
| EnQuest | | | | 60,43 | 47,94 | 50,84 | 41,82 | 33,2 | 17,66 | 20,86 |
| Fagerhult | 35,06 | 41,04 | 41,78 | 29,24 | 32,13 | 35,37 | 36,51 | 37,64 | 38,43 | 33,8 |
| Fast Partner | 37,2 | 32,68 | 29,65 | 32,32 | 30,39 | 28,31 | 29,5 | 26,02 | 27,07 | 34,87 |
| Fenix Outdoor | 55,66 | 65,3 | 67,26 | 69,03 | 73,03 | 75,15 | 78,03 | 51,19 | 52,21 | 58,79 |
| FM Mattsson | | | | 47,69 | 48,58 | 48,5 | 49,83 | 43,79 | 44,02 | 40,33 |
| Gränges | | | | | | 51,4 | 66,97 | 47,91 | 56,77 | 37,01 |
| Gunnebo | 23,61 | 20,39 | 32,59 | 42,99 | 44,78 | 38,85 | 33,75 | 35,11 | 34,36 | 34,05 |
| Haldex | 36,82 | 28,98 | 47,09 | 46,53 | 46,75 | 48,03 | 46,34 | 43,53 | 49,28 | 44,95 |
| Hansa Medical | | 90,79 | 65,33 | 85,09 | 84,87 | 96,12 | 89,96 | 91,7 | 94,39 | 91,32 |
| Heba | 61,45 | 60,67 | 56,31 | 54,71 | 56,07 | 58,15 | 56,47 | 53,28 | 55,04 | 52,64 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| HiQ | 70,36 | 66,03 | 74,47 | 71,12 | 71,22 | 70,5 | 72,02 | 70,59 | 69,39 | 69,23 |
| HMS Networks | 51,73 | 57,51 | 70,96 | 72,83 | 76,33 | 81,91 | 49 | 50,77 | 54,85 | 45,39 |
| Hoist Finance | | | | | | | 6,77 | 9,28 | 13,11 | 15,28 |
| Humana | | | | | 36,36 | 36,15 | 38,84 | 26,94 | 28,48 | 34,8 |
| I.A.R Systems | 82,69 | 78,77 | 80,16 | 80,42 | 78,05 | 78,31 | 79,84 | 76,88 | 72,96 | 70,6 |
| Invisio Communications | 33,93 | 8,58 | 14 | 11,91 | 22,22 | -4,13 | 6,67 | 49,55 | 74,9 | 80,3 |
| Inwido | | 24,14 | 38,78 | 40,66 | 40,67 | 49,56 | 53,68 | 54,83 | 55,53 | 47,73 |
| ITAB Shop Concept | 25,21 | 22,74 | 26,79 | 22,04 | 24,2 | 36,48 | 39,13 | 42,33 | 46,66 | 30,74 |
| KappAhl | | 15,99 | 11,32 | 22,11 | 14,84 | 26,21 | 49,41 | 56,05 | 56,62 | 58,08 |
| Karo Pharma | 86,94 | 83,4 | 84,81 | 83,64 | 67,6 | 59,07 | 59,17 | 67,48 | 56,29 | 40,44 |
| Lagercrantz | | 43,51 | 49,38 | 55,95 | 42,45 | 46,06 | 43,98 | 42,89 | 43,54 | 39,97 |
| Lindab | 38,56 | 38,79 | 40,35 | 41,93 | 41,66 | 40,97 | 45,53 | 48,04 | 49,11 | 51,3 |
| Lucara Diamond | | | | 94,49 | 70,6 | 66,91 | 82,09 | 72,09 | 74,58 | 66,22 |
| Lundin Gold | | | | 98,88 | 99,87 | 99,86 | 99,67 | 97,97 | 97,56 | 96,71 |
| Medivir | 83,68 | 77,41 | 74,98 | 83,7 | 80,75 | 81,3 | 85,65 | 90,78 | 89,72 | 90,18 |
| Mekonomen | 67,25 | 59,85 | 58,53 | 55,4 | 50,93 | 40,57 | 41,15 | 38,63 | 40,2 | 42,63 |
| Munksjö | | | | | | | 35,63 | 35,07 | 34,2 | 36,89 |
| Mycronic | 60,23 | 64,56 | 74,35 | 76,71 | 77,63 | 79,37 | 83,15 | 75,45 | 72,79 | 51,23 |
| Nederman | 49,66 | 50,02 | 55,14 | 30,13 | 33,67 | 28,88 | 28,46 | 30,9 | 32,63 | 37,02 |
| Net Insight | 69,44 | 76,71 | 82,11 | 83 | 86,44 | 88,76 | 88,4 | 86,11 | 79,29 | 77,41 |
| New Wave | 29,9 | 34,14 | 41,05 | 44,76 | 43,54 | 44,09 | 49,81 | 45,93 | 45,88 | 48,37 |
| NGEx Resources | | | | | | 70,28 | 73,72 | 74,07 | 81,31 | 88,3 |
| Nobina | | | | | | | | 3,78 | 4,71 | 14,49 |
| Nolato | 45,93 | 49,76 | 51,4 | 50,17 | 53,68 | 45,75 | 52,39 | 53,77 | 54,41 | 47,15 |
| Nordax | | | | | | | 11,8 | 10,84 | 12,24 | 13,44 |
| Nordic Waterproofing | | | | | | 43,31 | 48,43 | 50,95 | 55,59 | 61,45 |
| NP3 | | | | | | 9,77 | 12,97 | 41,46 | 35,86 | 35,33 |
| OEM | 58,88 | 58,99 | 61,71 | 63,74 | 63,31 | 62,61 | 65,91 | 49,15 | 50,9 | 52,91 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| OPUS Prodox | 61,75 | 71,58 | 72,17 | 72,49 | 73,37 | 28,32 | 34,29 | 27,44 | 33,85 | 34,65 |
| Orexo | 83,71 | 81,16 | 84,5 | 65,7 | 56,97 | 39,68 | 20,91 | 37,12 | 26,21 | 30,46 |
| Oriflame | 17,99 | 22,22 | 25,7 | 29,82 | 26,98 | 31,87 | 21,93 | 20,16 | 21,21 | 28,39 |
| Oscar P. | | | | | 69,5 | 40,99 | 33,72 | 37,62 | 32,79 | 32,51 |
| Platzer | | | | 29,07 | 29,64 | 29,12 | 35,65 | 34,86 | 35,43 | 33,92 |
| Probi | 91,86 | 92,57 | 93,99 | 91,02 | 89,74 | 89,83 | 87,52 | 82,93 | 82,16 | 74,21 |
| Qliro Group | | | | 34,17 | 25,68 | 15,83 | 38,99 | 55,67 | 45,47 | 40,45 |
| RaySearch Laboratories | 79,58 | 79,98 | 79,3 | 76,88 | 75,36 | 74,24 | 65,72 | 64,54 | 65,95 | 64,16 |
| Recipharm | | | | | | 36,92 | 37,6 | 39,44 | 48,11 | 52,37 |
| Rezidor Hotel | 48,83 | 48,01 | 46,69 | 46,37 | 44,06 | 39,84 | 40,61 | 51,35 | 53,18 | 52,88 |
| SAS | 20,02 | 26,8 | 34,52 | 31,73 | 30,35 | 31,16 | 16,73 | 20,94 | 18,98 | 19,88 |
| Scandi Standard | | | | | | | 13,3 | 28,63 | 29,44 | 27,8 |
| Scandic Hotels | | | | | | | | 26,86 | 48,1 | 50,22 |
| Sectra | 56,87 | 59,43 | 62,21 | 61 | 69,43 | 61,4 | 60,68 | 56,14 | 49,47 | 45,76 |
| Semafo | | 61,75 | 75,37 | 85,63 | 86,53 | 85,65 | 89,13 | 85,82 | 77,52 | 82,16 |
| Sensys Gatso | 86,64 | 47,66 | 80,5 | 88,26 | 88,09 | 89,31 | 78,81 | 79,31 | 49,95 | 63,46 |
| Serneke | | | | | 11,63 | 23,84 | 27,83 | 20,59 | 27,42 | 42,74 |
| SkiStar | 35,74 | 37,39 | 40,17 | 37,68 | 36,4 | 38,06 | 38,83 | 43,66 | 45,53 | 44,17 |
| SSM Holding | | | | | 21,87 | 28,38 | 21,77 | 26,43 | 31,88 | 29,09 |
| Svolder B | 95,73 | 93,23 | 88,58 | 95,35 | 98,5 | 97,4 | 98,79 | 99,78 | 99,57 | 99,81 |
| Systemair | 37,28 | 43,33 | 48,96 | 48,56 | 45,14 | 40,67 | 47,22 | 44,39 | 43,9 | 45,5 |
| Tethys Oil | 97,74 | 98,43 | 91,06 | 98,95 | 98 | 62,61 | 70,38 | 92,24 | 86,1 | 82,38 |
| TF Bank | | | | 6,67 | 8,95 | 8,01 | 9,54 | 11,57 | 12,42 | 15,95 |
| Tobii | | | | | | | 71,31 | 51,67 | 76,67 | 81,74 |
| Traction | 89,72 | 92,07 | 91,75 | 92,87 | 91,87 | 91,92 | 91,77 | 99,66 | 99,73 | 99,75 |
| Transcom WorldWide | 39,45 | 36,6 | 45,66 | 46,85 | 44,26 | 36,18 | 32,22 | 39,51 | 46,17 | 52,06 |
| Troax Group | | | | | | | 39,36 | 31,67 | 41,64 | 38,2 |
| VBG | 56,31 | 55,97 | 54,36 | 58,17 | 64,72 | 64,05 | 68,79 | 67,64 | 69,23 | 29,6 |
| Victoria Park A | 42,45 | 21,63 | 73,24 | 49,42 | 33,01 | 24,74 | 28,31 | 25,47 | 35,11 | 33,79 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Vitec Software** | 33,83 | 43,06 | 39,72 | 38,14 | 42,14 | 37,24 | 43,8 | 33,66 | 31,14 | 30,47 |
| **Vitrolife** | 84,62 | 85,33 | 86,85 | 76 | 73,68 | 60,36 | 66,13 | 72,25 | 79,77 | 81,6 |
| **Volati** | 23,62 | 30,14 | 35,56 | 27,47 | 25,1 | 30,76 | 10,35 | 10,94 | 37,19 | 69,61 |
| **Vostok New Ventures** | 93,57 | 75,77 | 99,71 | 99,72 | 99,65 | 99,51 | 99,5 | 99,62 | 93,21 | 94,8 |
| **Xvivo Perfusion** | | | | | | | 75,75 | 87,35 | 90,54 | 90,59 |
| **Öresund** | 83,9 | 98,29 | 87,97 | 39,13 | 95,08 | 92,35 | 96,71 | 95,95 | 95,95 | 95,44 |

# APPENDIX J - NASDAQ STOCKHOLM SMALL-CAP

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Actic Group | | | | | | 40,61 | 39,69 | 26,82 | 29,25 | 28,53 |
| Active Biotech | 38,72 | 34,59 | 37,84 | 36,13 | 58,47 | 48,79 | 52,8 | 56,1 | 40,19 | 44,22 |
| AllTele | 16,06 | 39,59 | 34,74 | 40,13 | 22,35 | 25,79 | 40,47 | 43,69 | 37,16 | 45,97 |
| Anoto | 80,58 | 81,21 | 84,32 | 81,62 | 59,26 | 53,44 | 38,34 | 37,18 | 59,69 | 54,35 |
| Arctic Paper | | | | 34,96 | 35,1 | 40,55 | 37,63 | 41,13 | 37,33 | 41,97 |
| Arise Windpower | 96,8 | 45,32 | 50,46 | 57,62 | 43,16 | 35,92 | 37,64 | 39,7 | 39,39 | 41,46 |
| Avega Group | 27,74 | 27,45 | 43,05 | 37,68 | 38,06 | 27,99 | 30,15 | 13,63 | 22,2 | 10,31 |
| B3IT Management | | | | | | | 12,66 | 24,27 | 22,05 | 33,8 |
| Bactiguard | | | | | | 20,55 | 19,65 | 63,95 | 61,73 | 61,75 |
| BE Group | 29,79 | 32,36 | 31,78 | 29,9 | 30,88 | 29,38 | 28,79 | 32,27 | 40,03 | 40,18 |
| Beijer Electronics | 38,15 | 31,17 | 33,3 | 27,22 | 29,7 | 28,49 | 27,19 | 33,6 | 36,27 | 29,43 |
| Bergs Timber | 37,59 | 37,14 | 37,2 | 33,99 | 31,6 | 56,39 | 51,59 | 47,16 | 52,32 | 48,43 |
| Bioinvent | 79 | 78,33 | 44,06 | 53,77 | 67,09 | 40,86 | 60,18 | 70,75 | 54,1 | 83,4 |
| Björn Borg | 67,32 | 68,97 | 76,23 | 75,76 | 72,14 | 49,57 | 45,52 | 46,73 | 50,25 | 53,69 |
| Black Earth Farming | 81,44 | 80,16 | 79,13 | 67,41 | 61,94 | 69,45 | 66,2 | 63,8 | 59,66 | 64,41 |
| Bong Ljungdahl | 32,55 | 33,57 | 36,07 | 20,86 | 20,95 | 19,05 | 25,71 | 19,22 | 16,54 | 43,33 |
| Boule Diagnostics | | | 68,62 | 65,09 | 70,94 | 72,56 | 57,76 | 60,71 | 59,75 | 63,08 |
| BTS Group | 50,1 | 55,57 | 58,6 | 57,99 | 59,93 | 62,98 | 68,57 | 63,72 | 59,59 | 57,55 |
| C-RAD | 80,6 | 72,44 | 66,5 | 70,95 | 66,44 | 42,66 | 61,75 | 55,1 | 54,39 | 69,15 |
| CellaVision | 45,68 | 47,61 | 66,02 | 69,8 | 70,54 | 69,96 | 70,27 | 74,81 | 83,26 | 80,4 |
| Concordia Maritime | 57,88 | 56,42 | 53,04 | 49,57 | 47,3 | 38,23 | 37,94 | 42,38 | 42,91 | 50,45 |
| Consilium | 40,2 | 35,35 | 40,21 | 34,31 | 35,97 | 31,32 | 28,7 | 28,76 | 25,41 | 22,81 |
| CTT Systems | 34,6 | 32,45 | 40,19 | 38,44 | 36,89 | 38,18 | 32,22 | 41,5 | 47,48 | 57,6 |
| Dedicare | | | | 54,4 | 31,19 | 36,3 | 36,97 | 41,42 | 53,58 | 52,39 |
| DGC One | 22,63 | 50,55 | 53,65 | 56 | 47,72 | 50,49 | 47,63 | 47,58 | 43,43 | 33,58 |
| Doro | 24,47 | 17,64 | 31,52 | 35,98 | 39,51 | 40,47 | 38,32 | 39,26 | 40,43 | 40,38 |
| Duroc | 55,77 | 56,43 | 62,97 | 56,97 | 50,43 | 50,19 | 47,09 | 42,68 | 51,1 | 52,34 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Edgeware | | | | | | | 60,16 | 56,91 | 50,21 | 75,54 |
| Electra Gruppen | 45,34 | 61,8 | 58,46 | 56,23 | 48,42 | 35,49 | 37,78 | 37,18 | 35,42 | 38,61 |
| Elos | 33,59 | 34,84 | 35,82 | 43,19 | 40,58 | 39,93 | 43,89 | 55,72 | 37,49 | 41,32 |
| Endomines | 90,48 | 90,88 | 92,69 | 31,39 | 18,61 | 26,97 | 68,14 | 69,3 | 61,6 | 51,57 |
| Enea | 69,61 | 71,5 | 74,07 | 77,58 | 73,6 | 79,88 | 84,5 | 79,42 | 74,06 | 43,02 |
| Eniro | 22,01 | 13,32 | 35,55 | 32,77 | 33,49 | 39,61 | 45,61 | 29,1 | 26,22 | 13,35 |
| Eolus Vind | 61,14 | 48,07 | 43,86 | 59,21 | 47,3 | 61,48 | 48,54 | 58,07 | 52,86 | 58,66 |
| Episurf | | | | 86,34 | 95,98 | 87,39 | 93,71 | 89,85 | 93,01 | 80,75 |
| Etrion | | | 70,14 | 7,79 | 0,55 | -3,23 | -2,19 | 4,93 | 1,04 | -16,04 |
| eWork | 12,72 | 17,08 | 18,43 | 16,07 | 15,24 | 12,4 | 10,57 | 8,71 | 6,24 | 5,84 |
| Feelgood | 31,02 | 33,69 | 25,48 | 29,49 | 29,17 | 36,78 | 41,45 | 42,46 | 41,97 | 48,34 |
| Formpipe Software | 36,98 | 51,7 | 63,66 | 63,69 | 64,95 | 41,31 | 45,08 | 47,12 | 51,55 | 53,75 |
| G5 Entertainment | | 92,53 | 89,49 | 77,72 | 82,26 | 74,5 | 79,81 | 70,9 | 69,85 | 62,53 |
| GARO | | | | | 52,03 | 50,75 | 51,3 | 48,5 | 49,83 | 51,98 |
| GHP Specialty Care | 65,53 | 69,62 | 68,34 | 53,94 | 53,99 | 47,93 | 46,49 | 49 | 52,12 | 50,83 |
| Havsfrun Investment | 70,86 | 64,76 | 96,54 | 99,04 | 98,04 | 92,64 | 98,77 | 91,68 | 99,14 | 92,59 |
| Hexatronic | | | | | 73,83 | 49,87 | 40,66 | 51,65 | 49,71 | 46,8 |
| Image Systems | | | 16,64 | 1,54 | 46,81 | 31,91 | 50,41 | 17,07 | 66,04 | 56,34 |
| Intellecta | 48,97 | 36,35 | 35,31 | 38,65 | 38,94 | 33,6 | 55,12 | 50,66 | 41,82 | 40,91 |
| Kabe | 53,16 | 49,34 | 61,51 | 65,37 | 65,03 | 65,95 | 69,11 | 71,31 | 70,08 | 65,97 |
| Karolinska Development | | 99,22 | 98,04 | 96,79 | 92,67 | 91,39 | 98,66 | 96,21 | 40,34 | 3,4 |
| KnowIT | 40,86 | 38,92 | 47,1 | 47,3 | 51,69 | 52,88 | 49,31 | 50,96 | 50,99 | 52,39 |
| Lammhults Design | 52,07 | 50,03 | 52,36 | 49,63 | 52,19 | 64,9 | 55,87 | 59,86 | 61,9 | 50,87 |
| Malmbergs Elektriska | 50,65 | 55,16 | 61,06 | 64,82 | 69,44 | 68,46 | 70,7 | 73,5 | 66,45 | 67,31 |
| MedCap | 65,17 | 66,86 | 55,75 | 58,06 | 54,66 | 53,59 | 36,93 | 51,1 | 48,4 | 51,44 |
| Micro Systemation | 77,83 | 71,18 | 69,43 | 56,54 | 62,89 | 52,62 | 50,99 | 50,01 | 56,46 | 58,23 |
| Midsona B | 32,44 | 35,31 | 52,84 | 52,72 | 55,44 | 57,94 | 60,58 | 62,64 | 56,4 | 51,49 |
| Midway B | 56,26 | 54,79 | 53,72 | 48,14 | 41,57 | 38,97 | 35,13 | 32,56 | 31,8 | 34,74 |
| Mips | | | | | | | | 69,46 | 76,46 | 76,03 |
| Moberg Pharma | | 67,43 | 85,59 | 5,56 | 83,06 | 63,48 | 74,19 | 84,44 | 88,77 | 45,58 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| MQ | | | 19,33 | 48,37 | 50,4 | 49,98 | 50,45 | 57,88 | 62,64 | 59,66 |
| Mr Green & Co | | | | | | 95,42 | 78,51 | 66,24 | 59,22 | 57,97 |
| MSC Konsult | 52,69 | 52,11 | 63,57 | 55,82 | 54,36 | 53,44 | 50,15 | 46,12 | 30 | 53,76 |
| MultiQ | 45,39 | 53,21 | 54,97 | 61,81 | 57,12 | 71,37 | 57,52 | 66,94 | 63,23 | 56,26 |
| NeuroVive Pharmaceutical | 59,79 | 94,81 | 90,06 | 97,68 | 95,22 | 88,16 | 83,7 | 82,15 | 88,48 | 93,13 |
| NGS | 68,07 | 32,66 | 36,27 | 60,78 | 64,69 | 62,78 | 57,24 | 73,32 | 72,15 | 67,86 |
| NOTE | 34,53 | 31,1 | 27,87 | 31,29 | 40,96 | 45,23 | 44,03 | 44,09 | 43,29 | 45,79 |
| Novotek | 57,44 | 54,03 | 56,62 | 56,16 | 55,95 | 56,64 | 54,03 | 54,33 | 54,4 | 54,85 |
| Oasmia Pharmaceutical | | 73,93 | 63,04 | 78,93 | 91,84 | 78,18 | 71,69 | 60,19 | 73,2 | 63,24 |
| Odd Molly | 75,03 | 74,79 | 76,25 | 80,73 | 76,82 | 78,43 | 64,88 | 65,37 | 64,75 | 54,65 |
| Ortivus B | 64,32 | 58,76 | 51,56 | 80,17 | 56,89 | 58,63 | 46,79 | 23,36 | 18,08 | 6,88 |
| Poolia | 58,6 | 55,71 | 52,26 | 36,03 | 34,86 | 29,73 | 28,44 | 34,45 | 32,43 | 33,17 |
| Precise Biometrics | 91,99 | 47,05 | 62,12 | 64,97 | 72,96 | 56,27 | 87,98 | 86,61 | 83,94 | 83,13 |
| Prevas | 45,69 | 56,66 | 52,64 | 53,72 | 54,78 | 39,92 | 36,95 | 41,09 | 40,04 | 38,52 |
| Pricer | 66,94 | 77,4 | 83,41 | 85,32 | 81,89 | 87,01 | 86,36 | 80,92 | 85,18 | 78,32 |
| ProAct IT | 30,63 | 24,84 | 24,06 | 21,41 | 14,26 | 15,31 | 16,86 | 17,48 | 19,19 | 18,41 |
| ProfilGruppen | 27,98 | 25,25 | 28,52 | 30,69 | 31,46 | 40,72 | 35,04 | 41,85 | 40,8 | 44,59 |
| Rejlerkoncernen | 56,47 | 56,96 | 59,53 | 52,2 | 48,86 | 47,59 | 40,67 | 46,81 | 41,72 | 40,59 |
| RNB Retail and Brands | | 42,19 | 41,19 | 55,78 | 46,15 | 34,85 | 37,91 | 25,83 | 28,42 | 29,34 |
| Rottneros | 45,47 | 39,86 | 77,51 | 82,2 | 75,28 | 76,74 | 71,06 | 77,32 | 76,33 | 77,3 |
| Seamless Distribution | 65,98 | 53,99 | 48,37 | 63,78 | 56,47 | 76,57 | 88,17 | 74,24 | 49,99 | 54,03 |
| Semcon | 23,48 | 33,57 | 30,48 | 32,96 | 38,36 | 46,58 | 48,51 | 48,36 | 45,24 | 44,51 |
| SinterCast | 71,17 | 83,78 | 85,3 | 88,66 | 93,29 | 93,86 | 89,35 | 91,32 | 87,59 | 89,12 |
| Softronic | 70,84 | 64,3 | 72,89 | 68,4 | 73,77 | 69,11 | 66,75 | 66,3 | 64,95 | 65,06 |
| Sportamore | | | | | 56,44 | 65,27 | 56,55 | 65,06 | 50,17 | 51,38 |
| Stockwik | 69,24 | 71,12 | 70,71 | 41,27 | 49,23 | 52,41 | 43,82 | 27,31 | 29,08 | 31,37 |
| Studsvik | 42,48 | 40,43 | 37,24 | 36,5 | 37,69 | 36,33 | 22,66 | 28,32 | 30,02 | 38,68 |
| Svedbergs | 71,47 | 73,37 | 74,57 | 64,55 | 63,35 | 58,97 | 61,93 | 61,97 | 63,36 | 35,05 |
| Swedol | 63,44 | 58,06 | 65,9 | 66,12 | 64,7 | 54,19 | 57,45 | 60,37 | 60,84 | 42,21 |
| TradeDoubler | 16,15 | 18,82 | 27,85 | 36,5 | 40,43 | 41,04 | 34,48 | 34,34 | 23,34 | 23,73 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Trention** | 54,42 | 48,09 | 55,1 | 60,47 | 61,99 | 73,79 | 75,24 | 75,37 | 80,53 | 98,35 |
| **Trigon Agri** | | 86,98 | 73,78 | 81,28 | 62,82 | 61,19 | 56,04 | 41,38 | 0,8 | 67,39 |
| **Uniflex** | 29,8 | 28,83 | 23,49 | 25,01 | 25,59 | 21,95 | 21,62 | 26,91 | 29,55 | 28,79 |
| **Venue Retail Group** | | 30,8 | 38,88 | 35,29 | 46,14 | 51,88 | 47,82 | 39,67 | 15,44 | 17,17 |
| **Viking Supply** | 38,97 | 42,43 | 37,02 | 46,89 | 39,68 | 36,61 | 35,81 | 38,82 | 33,67 | 38,99 |
| **Wise Group** | 45,72 | 56,56 | 58,1 | 56,82 | 33,13 | 39,99 | 47,24 | 45,74 | 43,25 | 43,71 |
| **XANO Industri** | 32,4 | 32,94 | 33,71 | 45,69 | 48,17 | 32,37 | 41,3 | 39,7 | 45,27 | 27,3 |

# APPENDIX K - SOLVENCY FIRST NORTH

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| A City Media | | | | | | | | 19,03 | 21,32 | 39,02 |
| Absolent | | | | | | | 38,37 | 62,34 | 72,5 | 75,47 |
| ADDvise Group A | 27,75 | 28,01 | 17,99 | 19,62 | 39,48 | 14,23 | 12,67 | 8,93 | 3,3 | 20,51 |
| Advenica | | | | | | 68,01 | 65,27 | 86,88 | 82,64 | 80,37 |
| Ages Industri | | | | | | 96,36 | 42,2 | 44,56 | 46 | 48,26 |
| Alelion Energy | | | | | | | | 44,45 | 65,3 | 81,8 |
| Allgon | 49,58 | 50,87 | 46,48 | 26,76 | 1,18 | 11,13 | 31,61 | 44,9 | 51,5 | 48,47 |
| ALM Equtiy | | 36,19 | 43,32 | 31,67 | 38,53 | 39,08 | 41,76 | 40,66 | 46,03 | 30,13 |
| Amasten | 73,2 | 66,05 | 51,07 | 48,68 | 40,41 | 75,33 | 26,47 | 38,67 | 36,64 | 31,03 |
| Aqeri | | | 60,1 | 63,73 | 51,08 | 33,49 | 47,71 | 47,86 | 6,91 | 0,49 |
| Arc Aroma Pure | | | | | | 8,82 | 54,12 | 55,15 | 78,96 | 70,3 |
| Arcoma | | | | | | 35,25 | 10,52 | 52,68 | 59,25 | 52,42 |
| Arctic Gold | | | 89,69 | 91,25 | 95,7 | 97,49 | 98,48 | 99,21 | 95,8 | 92,59 |
| AroCell | | | | 33,1 | 68,37 | 84,72 | 87,4 | 92,53 | 97,8 | 95,54 |
| Auriant Mining | | | 45,03 | 63,61 | 45,56 | 34,85 | 1,22 | -22,48 | -66,9 | -58,7 |
| Avensia | 45,75 | 50,61 | 46,21 | 14,89 | 26,61 | 35,97 | 39,48 | 44,33 | 51,77 | 59,83 |
| Avtech | | | | 40,14 | 56,43 | 40,29 | 64,11 | 89,4 | 92,46 | 96,86 |
| aXichem | | | | 22,22 | 40,56 | 46,16 | 63,69 | 74,62 | 85,09 | 87,92 |
| Bayn Europe | | | | | | | 32,29 | 81,08 | 74,52 | 53,85 |
| BIMobject | | | | | | | | 84,54 | 81,48 | 30,23 |
| Bredband2 | 39,99 | 28,75 | 29,83 | 40,82 | 40,1 | 44,92 | 43,36 | 45,4 | 45,04 | 40,86 |
| Brighter | | | | | | 45,99 | 3,22 | 71,14 | 78,08 | 86,93 |
| Bringwell | 32,17 | 34,37 | 39,63 | 45,46 | 48,27 | 52,13 | 50,35 | 71,28 | 63,57 | 76,92 |
| Brinova | | | | | | | | 51,76 | 45,91 | 40,54 |
| Byggmästare AJ Ahlström | | | | | | | | 37,14 | 41,79 | 44,93 |
| Byggpartner | 34,39 | 40,14 | 54,67 | 42,4 | 32,03 | 31,21 | 15,06 | 21,54 | 34,86 | 36,25 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Cantargia | | | | | | | 78,49 | 20,35 | 89,4 | 78,14 |
| Capacent | | | | | | | | 75,82 | 71,04 | 75,2 |
| Caperio | | 34,65 | 30,57 | 31,99 | 28,78 | 31,5 | 20,23 | 23,94 | 18,25 | 22,13 |
| Cassandra Oil | | | | | | 85,2 | 46,21 | 61,9 | 57,98 | 63,22 |
| Catena Media | | | | | | | | 35,17 | 44,27 | 39,25 |
| Cell Impact | | | | | 25,32 | 41,82 | 82,56 | 71,93 | 30,26 | 78,86 |
| Christian Berner Tech | | | | | | 16,65 | 18,77 | 47,7 | 49,3 | 50,17 |
| Cinnober | | | | | | | 56,74 | 48,8 | 43,19 | 35,45 |
| Clavister | | | | | | 23,41 | 45,96 | 66,99 | 61,98 | 75,84 |
| Clean Motion | | | | | | | | 42,22 | 25,3 | 54,15 |
| Cleantech Invest Sek | | | | | | | 98,3 | 98,46 | 98,9 | 89,36 |
| Clinical Laserthermia | | | | 87,99 | 85,72 | 85,21 | 89,35 | 85,44 | 87,39 | 62,5 |
| Confidence | 37,65 | 16,38 | 1,98 | 32,18 | 62,05 | 50,51 | 51,2 | 49,36 | 44,34 | 45,87 |
| Copperstone | | | | 84,01 | 89,53 | 91,17 | 92,56 | 81,59 | 77,16 | 69,06 |
| Corline Biomedical | | | | | | | | 85,02 | 85,02 | 92,53 |
| Cortus Energy | | | | | | 71,5 | 93,41 | 88,73 | 89,06 | 65,61 |
| CybAero | | 65,57 | 58,59 | 59,28 | 63,38 | 45,63 | 29,26 | 75,17 | 80,3 | 84,03 |
| DDM Holding | | | | | | | | 12,57 | 15 | 31 |
| Deflamo | | | 63,39 | 75,46 | 70,34 | 65,44 | 80,42 | 48,51 | 58,02 | 51,79 |
| Delarka | | | | | | | 39,45 | 38,47 | 31,26 | 37,95 |
| Diadrom | 68,05 | 58,67 | 72,27 | 61,11 | 59,72 | 60,86 | 60,18 | 62,85 | 57,94 | 64,15 |
| Diamyd Medical | | | | | | 95,99 | 88,91 | 86,56 | 84,73 | 77,46 |
| Dignitana | | | 43,65 | 61,71 | 61,12 | 78,94 | 80,28 | 69,02 | 85,61 | 87,52 |
| DistIT | | | | 64,73 | 64,95 | 54,75 | 29,6 | 29,87 | 25,88 | 34,46 |
| Dome Energy | | | | | 80,43 | 79,28 | 64,61 | 41,18 | -45,51 | -40,05 |
| Doxa | | | | | | 71,59 | 34,15 | 86,99 | 59,16 | 2,1 |
| Drillcon | 60,73 | 52,39 | 57,48 | 55,8 | 51,54 | 52,59 | 54,74 | 58,02 | 58,82 | 52,19 |
| Effnetplattformen | | | | | | | 74,67 | 76,42 | 92,84 | 93,67 |
| Ellen | 75,22 | 63,7 | 56,29 | 82,86 | 70,19 | 75,49 | 83,31 | 78,12 | 67,69 | 34,29 |
| Empire | 24,01 | 20,9 | 19,54 | 21,97 | 18,9 | 53,8 | 55,56 | 65,02 | 26,37 | 25,01 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Enorama Pharma | | | | | | | | 72,01 | 71,16 | 66,64 |
| Enzymatica | | | | | | 87,75 | 60,45 | 86,5 | 50,13 | 87,52 |
| EOS Russia | 93,68 | 97,81 | 93,58 | 97,39 | 98,97 | 99,14 | 98,68 | 98,07 | 97,25 | 99,52 |
| Evolution Gaming | | | | | | 60,93 | 74,58 | 73,49 | 61,84 | 69,42 |
| Fastator | | | | | | 28,23 | 54,77 | 36,61 | 78,24 | 65,99 |
| Firefly | 66,9 | 58,27 | 63,98 | 67,14 | 62,38 | 42,06 | 36,12 | 37,54 | 40,34 | 39,84 |
| Gaming Corps | | | | | | | | 75,69 | 85,5 | 77,41 |
| Generic Sweden | 37,58 | 32,84 | 23,97 | 37,9 | 37,19 | 50,66 | 52,41 | 54,28 | 53,66 | 64,16 |
| Genovis | 86,35 | 44,46 | 73,57 | 85,49 | 84 | 75,08 | 79,82 | 74,55 | 52,16 | 71,14 |
| GS Sweden | | | | | | | 58,21 | 40,53 | 45,95 | 70,91 |
| GWS Production | | | | | | 67,5 | 25,26 | 89,24 | 89,1 | 85,48 |
| Götenehus Group | 20,65 | 23,11 | 22,73 | 19,04 | 17,01 | 9,42 | 19,8 | 25,06 | 30,04 | 28,94 |
| Hanza | | | | | | 27,27 | 29,42 | 25,31 | 32,73 | 35,57 |
| Hedera | | | | | | 82,26 | 79,01 | 67,8 | 16,82 | 10,57 |
| Heliospectra | | | | | | 31,83 | 40,42 | 50,97 | 56,35 | 77,43 |
| Hifab | 38,61 | 28,67 | 34,97 | 42,79 | 48,14 | 46,18 | 43,3 | 40,22 | 23,2 | 33,16 |
| House of Friends | 66,75 | 77,94 | 74,73 | 50,32 | 49,5 | 57,92 | 56,52 | 63,01 | 50,54 | 57,97 |
| Hubbr | | | | | 46,48 | 35,43 | 31,86 | 14,94 | 6,02 | 23,12 |
| Hövding | | | | | | | | 92,81 | 84,96 | 59,46 |
| Immune Pharmaceuticals | | | | | | | | 46,33 | 21,73 | 36,98 |
| Immunicum | | | | | 72,9 | 92,17 | 75,49 | 90,98 | 90,24 | 79,86 |
| Immunovia | | | | | | | | 91,95 | 91,57 | 97,61 |
| Impact Coatings | 92,69 | 88,7 | 90,1 | 90,97 | 91,68 | 90,95 | 89,78 | 86,25 | 67,02 | 66,58 |
| Infant Bacterial | | | | | | | | 75,88 | 90,63 | 95,57 |
| Inission | | | | | | | 35,41 | 41,81 | 46,71 | 17,61 |
| Insplanet | 74,77 | 71,49 | 59,75 | 63,62 | 69,21 | 56,05 | 53,86 | 70,83 | 69,27 | 70,24 |
| Intuitive Aerial | | | | | | | | 9,6 | 22,7 | 29,93 |
| Italeaf | | | | | | | | 24,17 | 23,41 | 37,73 |
| IVISYS | | | | | | | | | 94,03 | 84,92 |
| Jays | | | | 40,24 | 4,5 | 53,84 | 61,56 | 66,76 | 55,77 | 65,49 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| JLT Mobile Computers | 73,69 | 71,19 | 70,6 | 50,85 | 58,94 | 69,88 | 71,97 | 66,87 | 62,59 | 68,71 |
| Kallebäck Property | | | | | | | | 39,66 | 38,44 | 39,05 |
| Kambi | | | | | | | 6,86 | 65,75 | 65,89 | 70,61 |
| Kancera | | | | 79,16 | 65,18 | 29,45 | 73,91 | 75,52 | 80,24 | 81,51 |
| Karessa Pharma | | | | | | | | 99,47 | 99,27 | 99,38 |
| Kentima | | | | | | 41,79 | 61,19 | 60,94 | 32,09 | 66,15 |
| Klaria Pharma | | | | | | | | | 98,7 | 98,77 |
| Kontigo Care | | | | | | | | 64,8 | 65,11 | 70,54 |
| Kopy Goldfields | | | | 88,81 | 86,31 | 92,84 | 88,66 | 90,84 | 89,33 | 95,72 |
| Lauritz | | | | | 22,68 | 14,48 | 9,02 | 2,86 | 2,65 | 12,49 |
| LeoVegas | | | | | | | 32,13 | 65,36 | 50,09 | 65,22 |
| Lexington | | | | | | 34,28 | 51,9 | 54,52 | 60,1 | 56,32 |
| LIDDS | | | | | | 95,12 | 97,95 | 97,65 | 97,49 | 92,98 |
| Lightlab | 84,2 | 59,87 | 28,2 | 27,27 | 67,52 | 64,78 | 89,09 | 91,59 | 91,3 | 92,04 |
| Link Prop | | | | | | | | | 40,93 | 40,87 |
| Mackmyra | 41,52 | 41,4 | 42,55 | 48,39 | 61,24 | 53,64 | 42,39 | 39,79 | 36,4 | 36,6 |
| Magnolia | | | | | | | 51,41 | 31,98 | 40,81 | 36,23 |
| Maha Energy | | | | | | | | | 94,84 | 96,3 |
| Mangold | | | 62,98 | 65,44 | 31,79 | 30,16 | 23,04 | 19,66 | 16,45 | 14,27 |
| Mavshack | | | | | | 15,77 | 77,39 | 36,25 | 84,06 | 68,79 |
| MaxFast Properties | | | | | | | | | 22,52 | 38,24 |
| Maxkompetens | | | | | | | | 12,99 | 18,29 | 24,59 |
| MediRätt | | | | | 86,67 | 78,49 | 68,33 | 59,86 | 70,24 | 66,94 |
| Mindmancer | | | | | | 29,84 | 58,55 | 39,26 | 12,97 | 25,43 |
| Minesto | | | | | | | 93,72 | 87,41 | 91 | 85,06 |
| Misen Energy | 96,56 | 97,97 | 89,43 | 67,59 | 68,33 | 56,44 | 52 | 58,63 | 50,63 | 78,9 |
| Modern Ekonomi | 36,73 | -2,24 | -6,42 | -79,22 | -100,98 | -175,16 | 38,61 | 20,41 | 20,02 | 23,94 |
| Moment Group | 36,57 | 38,15 | 38,89 | 39,58 | 34,42 | 37,31 | 34,71 | 41,89 | 35,1 | 27,32 |
| myFC Holding | | | | | | | 78,77 | 84,54 | 83,78 | 87,06 |
| myTaste | | | | 77,85 | 76,05 | 63,84 | 70,84 | 51,71 | 41,08 | 42,47 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| NattoPharma | | | | | | | 85,76 | 85,31 | 85,36 | 80,44 |
| NC Lahega | | | | | | 11,64 | 29,67 | 16,04 | 3,36 | 20,88 |
| Nepa | | | | | | | | -20,24 | 5,88 | 63,35 |
| NetJobs | 59,79 | 57,01 | 49,52 | 67,37 | 64,11 | 53,3 | 58,18 | 61,88 | 62,61 | 49,61 |
| New Nordic Healthbrands | 19,6 | 6,88 | 11,86 | 11,11 | 12,3 | 9,24 | 15,01 | 24,89 | 28,56 | 33,68 |
| Nexam | | | | | | 72,61 | 79,84 | 86,95 | 86,66 | 93,67 |
| Nexstim | | | | | | | | 61,38 | 38,51 | 42,99 |
| Nicoccino | | | | | | | | 98,22 | 96,4 | 96,93 |
| Nilsson Special Vehicles | | | | | | | | 31,03 | 46,94 | 54,54 |
| Nilörngruppen | | | | | 60,84 | 55,76 | 55,5 | 53,31 | 48,78 | 50,79 |
| Nordic Flanges | | 33,69 | 31,84 | 45,01 | 44,61 | 40,81 | 39,89 | 39,93 | 47,69 | 51,92 |
| Nordic Leisure AB | 60,38 | 48,29 | 37,14 | 26,01 | 18,5 | 40,18 | 91,31 | 86,24 | 81,45 | 85,98 |
| Nuevolution | | | | | | | | | 85,66 | 84,29 |
| Oniva Online Group | 55,64 | 49,88 | 58,77 | 53,36 | 46,76 | 27,07 | 57,19 | 48,59 | 45,88 | 54,49 |
| Online Brands Nordic | 66,91 | 65,08 | 58,68 | 44,23 | 56,2 | 46,32 | 2,9 | 37,15 | 23,02 | 13,22 |
| OrganoClick | | | | | | | 70,9 | 26,95 | 72,26 | 49,5 |
| Pallas | | | | 24,38 | 14,29 | 8,22 | 11,14 | 3,38 | 4,95 | 3,58 |
| Papilly | | | | | | | 35,78 | 62,95 | 44,57 | 5,77 |
| Paradox Interactive | | | | | | | | 69,69 | 66,08 | 75,51 |
| Photocat | | | | | | | | 36,9 | 62,9 | 63,31 |
| PiezoMotor | | | | | | 18,25 | 53,2 | 34,94 | 40,25 | 63,03 |
| Pilum | 58,84 | 57,79 | 46,9 | 32,69 | 37,83 | 30,35 | 37,47 | 37,38 | 16,38 | 19,85 |
| PledPharma | | | | 82,31 | 95,74 | 89,18 | 92,05 | 87,62 | 91,73 | 81,69 |
| Polygiene | | | | | | | | 57,81 | 80,93 | 72,04 |
| Polyplank | | | | | 26,12 | 20,05 | 34,58 | 8,61 | -18,65 | 29,08 |
| PowerCell | | | | | | 37,97 | 25,37 | 51,98 | 14,84 | 37,97 |
| Precio Fishbone | 84,76 | 86,71 | 80,69 | 80,82 | 79,65 | 80,51 | 76,53 | 75,69 | 69,71 | 71,82 |
| Precomp Solutions | 15,48 | 5,46 | 23,04 | 26,95 | 31,56 | 34,7 | 23,78 | 22,79 | 22,39 | 21,5 |
| Prime Living | | | | | | | | 43,12 | 44,93 | 39,4 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Robert Friman | | | | | | | 35,74 | 56,01 | 62,49 | 60,11 |
| SaltX Technology | | | | | | | | 98,39 | 78,81 | 68,79 |
| Saltängen Property | | | | | | | | 39,37 | 41,37 | 39,87 |
| Saniona | | | | | | -19,22 | -72,98 | 56,79 | 91,8 | 76,66 |
| Savo-Solar | | | | | | | -58,88 | -37,16 | 39,92 | 54,07 |
| ScandBook | | | 40,25 | 49,95 | 60,39 | 52,14 | 62,68 | 64,56 | 59,79 | 59,12 |
| ScandiDos | | | | | | | 34,72 | 75,26 | 58,36 | 55,66 |
| Scandinavian Enviro | | | | | | 25,54 | 34,9 | 76,36 | 81,02 | 82,94 |
| Scibase | | | | | | | 82,83 | 78,45 | 95,08 | 90,79 |
| Serstech | | | | | | 94,68 | 81,58 | 70,16 | 67,45 | 74,43 |
| ShaMaran | | | | | 82,82 | 95,9 | 67,42 | 65,99 | 43,53 | 42,61 |
| Simris Alg | | | | | 18,11 | 90,56 | 88,91 | 90,01 | 69,54 | 85,56 |
| SJR | 60,38 | 59,26 | 54,23 | 52,2 | 53,45 | 53,12 | 53,49 | 54,83 | 52,84 | 52,07 |
| Skåne-möllan | 73,58 | 83,9 | 81,38 | 85,46 | 84,39 | 89,05 | 87,92 | 85,57 | 85,24 | 87,76 |
| Skånska Energi | 65,91 | 63,81 | 65,84 | 64,07 | 70,08 | 58,79 | 61,95 | 64,62 | 65,4 | 59,59 |
| SolTech Energy | | | | | | | | 57,4 | 60,08 | 46,4 |
| Sonetel | | | | | | | 25,81 | 15,06 | 21,99 | 16,2 |
| SpiffX | | | | | | | | -12,58 | 63,77 | -12,7 |
| Sprint Bioscience | | | | | | 25,51 | 45,01 | 80,8 | 15,73 | 58,7 |
| Starbreeze B | 57,19 | 43,98 | 45,27 | 27,81 | 65,7 | 67,46 | 67,1 | 68,68 | 70,12 | 63,76 |
| Stendörren | | | | 75 | 76,32 | 66,1 | 74,67 | 35,8 | 29,64 | 34,39 |
| Stille | 57,71 | 57,46 | 61,81 | 71,58 | 62,05 | 57,17 | 66,34 | 69,04 | 70,47 | 77,5 |
| Stillfront | | | | | | | | 79,26 | 85,73 | 47,75 |
| Swedencare | | | | | | | 55,12 | 46,38 | 70,69 | 61,12 |
| TagMaster | 24,29 | 64,5 | 34,82 | 44,17 | 26,64 | 25,77 | 27,45 | 51,27 | 71,58 | 43,31 |
| Talkpool | | | | | | | | 10,79 | 23,44 | 22,82 |
| TargetEveryOne | | | | | | | | -51,12 | 49,43 | 29,39 |
| TC TECH | | | | | | | | 1,68 | 78,97 | 78,59 |
| THQ Nordic | | | | | | | | 44,77 | 48 | 74,22 |
| Tobin Properties | | | | | | | | 47,47 | 35,39 | 47,02 |

| Bolag | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Q4 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Torslanda Property** | | | | | | | | 39,42 | 37,84 | 38,39 |
| **Transtema** | | | | | | | 40,91 | 23,52 | 54,11 | 36,11 |
| **Unlimited Travel Group** | | | 27,67 | 32,44 | 37,96 | 33,9 | 30,75 | 29,26 | 32,49 | 23,09 | 29 |
| **VA Automotive** | | | | | | | 6,81 | 6,28 | 22,88 | 13,21 | 28,45 |
| **Verisec** | | | | | | | | 15,54 | 54,59 | 46,65 | 56,96 |
| **Vicore Pharma** | | | | | | | | 78,48 | 90,45 | 91,97 | 92,63 |
| **Vigmed Holding** | | | | | | | 88,44 | 94,47 | 77,51 | 55,8 | 37,01 |
| **Vostok Emerging** | | | | | | | | | | 98,41 | 99,41 |
| **Waystream** | | | | | | | | | 42,88 | 67,05 | 64,22 |
| **WeSC** | | 27 | 38,15 | 64,05 | 71,27 | 63,66 | 29,84 | 3,54 | -2,76 | -13,27 | -3,31 |
| **West International** | | | 57,93 | 63,98 | 67,66 | 65,5 | 51,27 | 56,33 | 43,99 | 52,56 | 56,49 |
| **Xbrane Biopharma** | | | | | | | | | 94,15 | 63,07 | 90,85 |
| **Xintela** | | | | | | | | | 80,29 | 70,24 | 87,98 |
| **ZetaDisplay** | | | 48,74 | 49,47 | 35,98 | 53,34 | 54,15 | 42,38 | 33,56 | 21,53 | 37,59 |
| **Zinzino** | | | | | | | | 40,28 | 52,1 | 55,6 | 50,58 |

# APPENDIX L - CALCULATIONS

The weighted average of repo rate for each year since 2006 was calculated. That is, if the repo rate was 0.5 for the first three months of 2011 and and then 1.0, the weighted average for that year would be 0.5 * 3/12 + 1.0 * 9/12 = 0.875..

Correlation measures are used to investigate how two variables covary (Taylor, 1990). A correlation takes on a value between –1 and 1. According to Evans (1996) the following rule of thumb can be used to determine how strong a correlation is:

.00 < r <.19 “very weak”

.20 < r < .39 “weak”

.40 < r < .59 “moderate”

.60 < r < .79 “strong”

.80 < r < 1.0 “very strong”

The formula for Pearson’s r, which is a common correlation coefficient, was used when calculating the correlation (Ahlgren, Jarneving and Rousseau, 2003). The formula is:

$$r = \frac{\sum (X - \underline{X})(Y - \underline{Y})}{\sqrt{\sum (X - \underline{X})^2 \sum (Y - \underline{Y})^2}}$$