Bachelor Thesis
Stockholm School of Economics
Department of Finance
Spring 2015

Swedish Investment Companies and Behavioral Determinants of the Relative Valuation to NAV

Mattias Svensson* and Olle Boström**

May 18, 2015

Abstract. The discount to Net Asset Value (NAV) in Swedish investment companies is a phenomenon that has been present for decades. This study aims to explain part of the discount valuation without taking firm-specific characteristics into consideration. Instead, we use several regression models where only market-wide behavioral arguments are used. Specifically, we investigate whether noise trader risk and noise trader sentiment can explain the discount to NAV in Swedish investment companies. Our findings show that noise traders do in fact contribute to the relative valuation to NAV. We find evidence that when noise traders are enthusiastic the discount decreases and when noise traders are pessimistic the discounts widen.

Keywords. Swedish investment companies, closed-end fund discount, noise traders, behavioral finance.

Tutor. Daniel Metzger.

Contact. For questions or other subjects related to this paper, please use email addresses *22825@student.hhs.se or **22828@student.hhs.se to contact the authors.

Acknowledgements

We would like to thank Arne Karlsson, Chairman of the board and former CEO of Ratos for valuable insights in the subject in general and in Ratos' strategy in specific, Elias Porse, Chief Analyst at Nordea Markets for help with data collection and valuable insights, Jan Glevén, reporter at Swedish business paper Affärsvärlden for help with data collection, and our tutor Daniel Metzger, Advisor and Assistant Professor at Stockholm School of Economics for valuable insights and discussions.

Table of content

1. Introduction

This study is set to investigate the discount to Net Asset Value (NAV) in Swedish investment companies. Most of the Swedish investment companies are valued at discount while some are consistently traded on premium. It is uncommon for a Swedish investment company to trade at par for longer than temporary. The discount valuation may bring up some problems for the investment companies. The most noticeable problem caused by the subpar valuation is that it is very expensive to issue new shares to raise capital for an acquisition since the shares are worth less than its assets. Due to tax reasons, they cannot accumulate large cash holdings and due to the overall risk, they cannot use much leverage. To change or increase the holdings, an investment company must thus either liquidate an existing position or issue new shares. Another problem with large discounts is the increasing risk of being acquired and liquidated by an arbitrageur willing to realize the NAV.

The discounts have been present for an extensive period of time and the phenomenon has been highly debated among analysts, Swedish media, and individual investors during the same time period. It has further been a reoccurring topic both within top management and in the board rooms of the investment companies over the last decades.

The previous studies on this topic mainly focus on firm-specific characteristics such as cost structure, taxation, and agency costs which are used in models trying to explain the discount valuation. However, the research on Swedish data is highly limited when it comes to the behavioral aspects of the valuation. What we aim to do is to bring up this perspective and try to explain part of the discount valuation with behavioral argumentation. Specifically, we test for the noise trader effect on the relative valuation to NAV, i.e. how noise traders on the Swedish stock market affect the discount/premium valuation in the Swedish investment companies.

What we find is that noise traders indeed affect the discount. We use several measures of noise trader sentiment which we argue should state when noise traders are in either a high or a low sentiment. We find that both Forward-PE and the VIX are highly related to the discounts and thereby serve as good measures of noise trader sentiment. Our results show that in times with enthusiasm and high expectations the discounts narrow and premiums increase and in more pessimistic times the discounts increase and premiums decrease.

This behavioral explanation has quite large implications. Firstly, it shows that the investment companies are highly exposed to this type of risk and that they can do very little to affect the discount and fluctuations in discount without changing the business strategy. Secondly, it contributes to future research on this topic since the noise trader effect should be incorporated in models trying to explain the relative valuation to NAV on the Swedish market.

2. Background

2.1 Swedish investment companies

An investment company is a company that owns shares in other firms and holds them in a portfolio. The generated cash flows in the portfolio companies constitute the cash flows in the investment company commonly through dividends or by liquidating the positions. Owning shares in a Swedish investment company can therefore be considered as owning a part of a pre-specified portfolio of other shares.

In Sweden, for a company to be a pure investment company it has to have only firms listed on a stock exchange in its portfolio. If it holds firms that are unlisted it will be considered an impure investment company. The most common way is to have at least a part of the portfolio unlisted, i.e. most investment companies on Nasdaq OMX Stockholm are impure. Table I in the Appendix displays the fraction of listed shares in Large Cap investment companies.

The Swedish investment companies have their origin in the beginning of the 20th century when the large banks purchased a lot of shares in troubled Swedish companies after the Great Depression. Due to new regulations the banks were not allowed to own shares in other businesses, and new firms called investment companies were created to get around this problem. Other investment companies have been founded when wealthy families have grouped their holdings in specific listed companies open for everyone to invest in. The investment companies have had an important historical role with providing capital to the Swedish firms, keeping a long-term perspective and keeping the ownership domestic.

Usually, any firm's market value is the market value of the net assets in the firm, the Net Asset Value (NAV). The NAV is often calculated as the highest of the net realizable value or the present value of future generated cash flows less net debt (Lönnqvist et al, 2013). In a pure investment company with only listed firms in its portfolio it should be very easy to state its market value since it should be equal to the value of its holdings in other firms. As the portfolio firms are listed on the stock exchange the shares already have a market price. The market value of a pure investment company with 100% listed holdings should by this logic be equal to its NAV. Though, this is not the case. The Swedish investment companies are traded either at discount, i.e. the value is lower than its NAV, or at a premium, i.e. the value is higher than its NAV. Furthermore, the discounts are not static. They seem to fluctuate vastly over time.

2.2 Problem with a discount valuation

A first look at this phenomenon might lead your thoughts towards an arbitrage opportunity. If you could buy stock at a discount through an investment company, one simple arbitrage strategy would be to sell short the expensive stock traded directly on the stock exchange and take a long position in the subpar traded investment company, creating a perfect hedge. However, there are some problems with this strategy. Firstly, since the investment companies are like eternal funds, i.e. they are not terminated, there is no explicit point in time where the asset values would be realized and the discount/premium would disappear. Since the discount or premium is always present and seem to fluctuate more or less at random there is a great chance that the discount will worsen and thereby you will lose money. Furthermore an investment company can at any time take a position in an unlisted firm which makes the long/short strategy impossible since you cannot buy or sell shares in the portfolio firms if they are not available on the stock exchange.

This shows that there are no real arbitrage opportunities because of the discount/premium valuation. However, one could note that if you buy the whole investment company and immediately sell the assets you would make an instant certain profit. Assuming no liquidity issues this is true, there is an opportunity for arbitrage if you have enough capital to buy out the whole company. And this is also the reason behind why there are so few investment companies left (Karlsson 1999). In the beginning of the 1980s there were 30 investment companies listed on the Stockholm stock exchange and in 1999 there were only 7 left. The fastest and most certain way to realize the true value of the portfolio was then and is still today either through an acquisition or by liquidating the whole company.

This means that the investment companies that are left assumedly share some special characteristics. Today the number of investment companies has increased again to approximately 15. One major reason for survival is obviously the size. If the value of an investment company is large enough there will be fewer buyers with enough capital to realize the values. Today, 7 or about half of the listed Swedish investment companies are listed on the Large Cap category of Nasdaq OMX Stockholm (companies with a market value of over 1 billion euro). However, even if the buyers with enough capital are few, they should still be present. Another, more important, requirement to be able to buy a company is that it must have present owners willing to sell. One salient characteristic of the Swedish investment companies is that they often have a very strong major owner. This causes some problems for the potential acquirer. Firstly, this major owner is in most cases a wealthy family which fortune is invested through its own

investment company[1]. The investment company can therefore be viewed as a tool or a channel for investments and not an asset that is supposed to be traded. Secondly the free-rider problem explained by Grossman and Hart (1980) where the selling part will not accept a price lower than the NAV, will cause the selling part to receive the whole arbitrage. Thirdly, some of the investment companies have been active for 100 years so there are likely nostalgic reasons for the major owners not to sell to an arbitrageur.

There are also some other ways to try and keep acquirers distant. One occurring strategy is to use a liquidation clause stating that the company is to be liquidated if the discount to NAV becomes too large[2]. Since the true value of the assets would be realized if this happens arbitrageurs create a buy pressure whenever the share price approaches the stated limit. This buy pressure is raising the price and thus reducing the discount. This clause is therefore working to prevent a discount that is too large, making it more unattractive to arbitrageurs.

The discounts should be viewed as a problem for the investment companies, their board of directors, and their owners. Except the risk for the company to be purchased or liquidated, a big disadvantage with the discount valuation is the possibility to issue new capital for financing investments. It would be hard for an investment company with a discount valuation to issue new shares to bring in capital. If the new shares are issued to the NAV, the share prices would immediately decrease with the discount. If the new shares are issued to the market price of the investment company it will bring in less money, and the investment company need to issue even more shares. This is thus very expensive. Because of the Swedish tax regulations it is hard for an investment company to accumulate large cash holdings. Further, because of the overall risk, the investment companies seem to not want to take on too much debt. New investments are therefore hard to finance for a company traded at discount.

The discounts have therefore been discussed frequently in Swedish media for quite some time. In the mid-90s some of the CEOs were determined to reduce the discounts and one investment company went as far as changing the whole business strategy (Karlsson, 1999). The change of strategy however, was the only case where the efforts proved successful since the discount in fact disappeared[3].

---

[1] For instance the Wallenberg family owns at least 50% of the voting rights and 23% of the capital in Investor AB and the Söderberg family owns at least 70% of the voting rights and 35% of the capital in Ratos AB according to their respective official websites 2015-04-05.

[2] Svolder AB has a liquidation clause (2015-03-01)

[3] The CEO of Ratos, Arne Karlsson, argued that the discount valuations in Swedish investment companies were motivated and the only way to avoid it was to restructure and take on a new strategy, based on his earlier research at Stockholm School of Economics. The change in strategy showed it was possible to go from discount to a premium valuation in just a few years.

Today the discount to NAV is still heavily debated both among analysts, journalists and at the top management level[4]. However, no additional actions of changed business strategies have taken place in order to reduce the discount.

2.3 Firm-specific explanations

At a first glance, investment companies trading above or below par might seem strange. However there are some logical factors that can explain at least a part of the phenomenon. The presence of a discount or premium valuation can be understood with some theoretical principles.

2.3.1 Expenses, agency costs and taxes

The investment companies have costs like any other company. They have employees that need a salary, they have a headquarters, etc. which will lower the profit. This means that owners of investment company stock will have to pay for overhead costs twice, first in the portfolio firms and later in the investment company. This could resemble as the management fee in a regular fund. If an investor buys the portfolio companies directly on the stock exchange he/she will not have to pay double for these types of costs. Therefore there should always be a discount in the investment companies corresponding to their overhead costs. This was first investigated by Malkiel (1977), but he had difficulty to find evidence empirically. Some years later Kumar and Noronha (1992), with a larger sample over a longer time period, found evidence that discounts are statistically significantly related to expenses.

Agency costs such as Empire Building could also be a reason for the discount valuation, especially if management fees or cost structures are too high (Boudreaux, 1973).

Boudreaux (1973) is the first who clearly emphasizes how expectations on the management team could lead to both discounts and premiums, and also explain the fluctuations in between. The expectations of the portfolio firms' ability to generate cash flows are incorporated in their respective market values. However, there should also be expectations regarding the investment decisions in the investment company. These expectations for future performance of the closed-end fund and/or the investment company could be either high or low. The activity by the management team could lead to good investments or bad investments which should have impact on the valuation. Boudreaux even argues that the only time we could expect the price of a closed-end fund to be equal to its net asset value, or hold a constant discount relationship is when its portfolio holdings are expected to be constant in the future. If the market expects that the management would make better investments in the future leading to

[4] In February 2015 Lorenzo Grabau, CEO of Kinnevik, explicitly stated that the company should work towards a lower discount to NAV.

higher return it would be valued to a premium, and if the market expect it to do worse investments it would translate into a discount. The strength with this expectation explanation is that it could describe both premiums and discounts.

The taxation of capital gains should also be a reason behind a discount valuation according to Malkiel (1977). The NAV does not take into account the tax that has to be paid when an investment company sells its assets. The capital gains that have been generated have to be taxed and the future cash outflow would motivate a discount. Though, Malkiel states that this could only correspond to a discount of a maximum of 6 percent. Important to consider here is that the tax regulations are different between countries. The research that proves the impact of unrealized capital gains is based on the American tax system. In Sweden the regulation is based on the argument that investment companies are intermediate holders and when listed on the stock market they create possible value for everyone. Therefore investment companies have special regulations regarding capital gains, with the objective to equalize the tax burden for indirect and direct holdings for investors. Capital gains are free from taxes but instead the investment companies have to pay a flat-rate tax every year based on the market value of its portfolio, according to the Swedish law about income taxes, Inkomstskattelag (SFS 1999:1229). Also Hjelström (2007) describes how the American system is different from the Swedish and that the only study that give evidence for the unrealized tax gains are Malkiel's (1977).

2.3.2 Different types of portfolios

A common explanation for premium valuations is that an impure investment company might have some attractive unlisted holdings that you can only attain by buying shares in the investment company. This might lead to a buy pressure that increases the value of the shares in the investment company. If the pressure is high enough, the investment company starts to trade at premium.

All investment companies hold different types of firms in their portfolios. They can also hold different types of shares in their portfolios e.g. listed or unlisted, stock with different voting rights, and stock in large or small firms. The different types of stock might have different liquidity. If the value of the shares is not easy to realize, the NAV is associated with some degree of uncertainty. A high ratio of illiquid assets, e.g. letter stock, in the portfolio should translate into a higher discount because of an illiquidity premium (Malkiel, 1977). There should therefore be illiquidity issues reflected in the value of the investment company even though the investment company stock itself might be highly liquid.

Diversification in the assets of an investment company could be a value destroying activity, even though at first it seems to be positive for an investor to be able to get diversification

for free by buying an investment company. Investors have heterogeneous beliefs and would value an already fixed portfolio differently. An investor could buy his preferred portfolio by investing in all individual securities he/she wants. Therefore selling a fixed portfolio might be punished with a lower value than its NAV, leading to a discount. Hjelström (2007) proves that this is the case and finds a positive relation between diversification and discount. A higher level of diversification increases the discount. But Hjelström argues that the impact of diversification is affected by the ownership structure. Diversification is negative for the investment company only if the ownership is not concentrated to a few individuals. In that case diversification could be positive.

2.3.3 Ownership structure

Formal and controlling power is positively related to the discount. This means that when the formal power is higher, the discount is higher. This fact is stronger when shares with different voting power are used. When the power is concentrated to a few individuals and a small group, they can prioritize their own interest, and not work in the best interest of all owners. Thus, the made decisions would not always lead to the highest possible return but rather to remain in power in underlying holdings. The market would therefore value the investment company with a discount. This is sometimes called Empire Building, which is a type of agency cost. Earlier research on power and the impact of blockholders are done by Barclay, Holderness and Pontiff (1993), where they argue that the greater the managerial stock ownership is the larger is the discount. In their study, the closed-end funds with blockholders have an average discount of 14% but in funds without it is only 4%.

Previous performance of the investment company might be used as a proxy for future returns. Hjelström (2007) found that there is a significant correlation between past performance and premium valuation in British investment companies. For pure investment companies that are consistently trading on premium a good track record with high returns seems to be the best explanation. This explanation however has some flaws since a rational investor could simply copy the portfolio and thus receive an even higher return. Also Roenfeldt and Tuttle (1973) find early but weak evidence that performance was related to the level of discounts.

Even though these firm-specific explanations are logical, other researchers have had trouble explaining the discount with these factors. Therefore it seems that different factors are referable to different investment companies. Perhaps the premium valuation in pure Investment Company A is derived from previous performance while the premium valuation in impure Investment Company B is explained by attractive unlisted holdings. If this is the case it might seem that the factors have little or no effect on an aggregate level. Furthermore, these

explanations might change over time as the investment companies make changes in their portfolios. This would further reduce the statistical significance of the factors and shows the complexity of this matter.

A summary of the firm specific explanations tells that a number of factors motivate that investment companies are traded at a discount. Only the expectations of future investments' returns could fully motivate both a discount and a premium valuation.

2.4 Behavioral explanations

While some researchers have found that the discount partly depends on some firm-specific characteristics, most cannot explain the vast fluctuations in the discount. The discount changes more frequently than the characteristics change and more frequently than there are news released about the investment companies. Perhaps, the market just changes its perception of an investment company very frequently. One should though note that changes in the market's perception of future cash flows should not affect the discount. If there is news that changes the value of the NAV, the value of the investment company should always change in a fixed proportion in the same direction. The market expectations must thus change regarding some other part elaborated on in the previous section or alternatively the fluctuations depend on something else.

2.4.1 Noise trader risk and noise trader effect

Noise trader risk is a risk that not fully rational investors could drive asset prices up or down, away from the fundamental or 'fair' value of the assets (De Long et al, 1990). Noise trader risk is a behavioral explanation to why assets could be priced inefficiently and why they could move without a rational explanation.

Investors could be divided into two groups, rational investors and not fully rational investors or noise traders. A rational investor bases his/her investments on rational and fundamental information. A noise trader is an investor who bases his/her investments on feelings or speculation to some degree rather than solely on fundamental information. Rational investors and noise traders are trading the assets at the same time but might base investment decisions on different beliefs.

Often, the rational investors can gain from the mispricings created by the noise traders by selling if noise traders drive the price too high and buying if they drive it too low. Therefore, rational investors should always trade the price back towards its fundamental value. But in some cases the mispricings could survive in equilibrium. For this to happen there must firstly be enough noise traders that have the same beliefs. Secondly, the noise trader risk must be

positively correlated with systematic risk, or otherwise it can be diversified away (De Long et al, 1990). Both assumptions can be interpreted as that the noise traders overreact to news about the market. If there is good news, noise traders become too enthusiastic and when there are bad news noise traders are too pessimistic. This interpretation is quite strong and makes both assumptions reasonable. If both assumptions are satisfied, noise traders should be able to move the prices enough so other rational traders would make a loss trading against it. This is however only true if the investment horizon among rational investors is limited.

De long et al (1990) argue that rational investors are short terministic due to constant performance evaluations and the synchronization risk. Therefore, the mispricing will be too costly to arbitrage away. They also argue that the sentiment of the noise traders is stochastic, which means that rational investors cannot forecast exactly when the noise traders' expectations will be high or low. Noise trader risk should be equal for the whole market and should be considered a systematic risk that cannot be diversified away. Therefore, it should be a risk that investors need to be compensated for. Further, if noise traders are present across the whole market, it implies that the investment companies should be subject to a double effect. Firstly, the noise trader risk should be incorporated in the value of the portfolio firms affecting the NAV. Secondly, the same risk should be incorporated in the investment company stock price as well affecting the value of the investment company. The double effect of noise trader risk should thus lead to that closed-end funds trade at a discount to their NAV.

De long et al. also means that the noise traders' expectations about future returns are changing and are unpredictable. Sometimes the noise traders are optimistic and sometimes pessimistic. Therefore noise traders could drive the price compared to NAV in a seemingly unpredictable pattern both up and down, leading to both discount and premium.

Two effects should therefore be present. Firstly, the noise trader risk should be discounted and included in the price in the same way as other systematic risks such as market risk. Secondly, the noise traders could, at any given point in time, be either enthusiastic or pessimistic. The total noise trader effect could thus be both net positive or net negative resulting in a premium or discount valuation respectively. One should note that both effects are market wide and thus, they are not only affecting the investment companies. The point is that the investment companies are subject to the double noise trader effect, one in the portfolio companies and one in the own stock.

The strength of this explanation is that it explains both premium and discount valuation. You could interpret a consistent premium valuation in a pure investment company as a general positivism towards some aspect of the investment company among noise traders.

Furthermore, it also explains the fluctuations in discounts, something that firm specific characteristics have had trouble doing.

2.4.2 Investor sentiment in American closed-end funds

Investor sentiment has shown to impact the relative valuation to NAV in American closed-end funds (Lee, Shleifer and Thaler, 1991). The value of the American funds could to a high degree be explained by the return in small stocks and the different clientele on the market. Firstly Lee Shleifer and Thaler argue that the discount of closed-end funds are moving so much together that firm specific explanations should not be able to describe it. Some other market wide factors therefore need to have impact on the discount. Further they argue that it is the same type of investors that are investing in both closed-end funds and in small stocks in the US. They find evidence that when small stocks aggregately generates a higher return than they are expected to according to their usual return relative to the overall stock market, discounts of the closed-end funds are decreasing. The fact that the discounts of closed-end funds are so related with the abnormal return of small stocks which they fundamentally would have nothing in common with is evidence for a behavioral explanation. They argue that the same irrational investor sentiment that are affecting small stocks also have impact on the closed-end funds.

2.5 Issues with previous research

The previous research on American closed-end funds is quite rigorous. There are studies exploring both rational and behavioral explanations to the discounts. However, the conclusions from these studies are not directly transferable to the Swedish market since there are large technical differences between Swedish investment companies and American closed-end funds.

2.5.1 Differences between US closed-end funds and Swedish investment companies

1. Lee, Shleifer and Thaler (1991) build their main conclusion on the fact that there is the same type of owners in both the closed-end funds and the smallest stocks on the stock exchange, namely individual investors. According to Hjelström (2007), only 5 percent of owners in American closed-end funds are institutions. In the Swedish investment companies the owner structure looks different. Almost 60 percent of the shareholders in the largest Swedish investment companies have an institutional nature (see Table II in the Appendix). Since there is a large difference in the ownership structure, the main conclusion from Lee, Shleifer and Thaler's study cannot be applied to the Swedish market.

2. In the US there are restrictions when it comes to debt and leveraging. The maximum allowable debt in American closed-end funds is 15%, regulated by the Investment Company Act of 1940

(2012). There are no restrictions of the capital structure in the Swedish investment companies. This means that the financial risk should differ between the Swedish investment companies and the American closed-end funds. It also means that the financial risk should differ between the Swedish investment companies. Several of the American studies build on the fact that discounts in American closed-end funds are highly correlated. Greater differences between firms mean they should move more independently and have lower correlation.

3. Swedish investment companies have eternal life spans. American closed-end funds are terminated, either by liquidation or by transformation into open-end funds after a certain amount of time. When this happens, the discount in the funds decreases (Brauer, 1984, and Brickley & Schalheim, 1985). The predictability in discounts towards the end of a US closed-end fund's life cycle is therefore not present in the Swedish investment companies. The eternal lives will further reduce the predictability since the Swedish investment companies can strike a new, assumingly controversial, deal at all times. American funds should make fewer risky investments towards the end of their life making them less volatile. Fluctuations in the discount in the Swedish investment companies should therefore be even less deterministic and more independent between firms.

4. The taxation of investment companies differs between countries as mentioned in section 2.3.1. The uncertainty and implications of unrealized capital gains in American closed-end funds is thus not transferrable to Swedish investment companies. In Sweden, if a company is regarded as an investment company from a taxation point of view, the capital gains is exempt from tax. Therefore the Swedish investment companies and American closed-end funds is not at all comparable in this aspect.

However, since different countries have different tax policies, a potentially foreign part of a portfolio might be taxed differently with possible deferred tax liabilities from unrealized capital gains. The different fractions of foreign firms in the Swedish investment companies' portfolios should further lower correlation and comovement between companies.

5. Swedish investment companies have different ratios of listed firms, currently ranging from 12% to 100% (Table I in the Appendix). The most common ratio is approximately 80% listed holdings. A high ratio of unlisted firms means less transparency and higher uncertainty. Unlisted holdings could be both positive and negative for the value of the investment company depending on the markets perception of the holdings compared to the reported NAVs. Different ratios of unlisted firms and the perceptions of the holdings among investors should have a large impact on

the relative valuations to NAV in the Swedish investment companies. This should lead to even lower correlation between firms.

2.5.2 Limitations of previous studies

Because of these differences, the American explanations – both rational and behavioral – should be tested on the Swedish market as well. Previous research on the discount to NAV in Swedish investment companies is limited. Further, the existing studies using Swedish data are highly focused on the rational explanations using firm specific characteristics as explanatory variables (e.g. Hjelström, 2007). There is no salient Swedish research focused solely on the behavioral aspects.

We will not test for firm-specific characteristics since this has already been tested. Our approach is instead where there is a cavity in the research on Swedish data, namely on the behavioral aspects of the discount.

Because of the large differences between Swedish investment companies and American closed-end funds we do not expect to be able to explain the valuations in the same way as previous American researchers such as Lee, Shleifer and Thaler (1991) who explain the discounts with differences in clientele on the market and individual investors.

However, we believe that noise trader sentiment and expectations do affect the relative valuations to NAV in Swedish investment companies. Since the discount cannot be explained fully with firm-specific characteristics, it is logical that something non-firm specific affects it.

3. Hypotheses

We hypothesize that noise trader expectations and noise trader sentiment can explain the fluctuations in the relative valuation to NAV in the Swedish investment companies. When noise traders on the Swedish stock market are enthusiastic they should create a buy pressure that affects the discount and when they are pessimistic they should create a sell pressure that affects the discount. The noise trader sentiment and the buy/sell pressures should affect both the value of the portfolio and the value of the investment company but have a larger impact on the investment company due to the double noise trader effect explained in section 2.4.1. This should translate into changes in the discounts. If noise trader risk and market risk is positively correlated, market factors should be able to capture the noise trader sentiment. If the market is strong, and the noise traders are enthusiastic about the future earnings, they should overreact and drive up the prices. This state is categorized as a high noise trader sentiment where we should see lower

discounts and higher premiums among the Swedish investment companies. If the noise trader sentiment is low we should see higher discounts and lower premiums.

3.1 Hypothesis One

Forward Price-Earnings ratio (Forward-PE) is a measure of the stock price today compared to expected future earnings in 12 months. A Forward-PE of the OMXS as a whole will serve as a measure of aggregated expectations on the whole stock market. A high Forward-PE means today's stock prices are high. When today's stock prices are high compared to expected future earnings, we categorize the market as strong. A strong market should mean that noise traders are enthusiastic with high expectations, i.e. we have a high noise trader sentiment. We hypothesize that in these cases the present discount to NAV should be lower than in times with less enthusiasm. When future P/E is high (low), the discounts should be low (high).

H1: Forward-PE is negatively related to discount to NAV

3.2 Hypothesis Two

When the Swedish Central Bank (The Riksbank) holds the repo rate high, you will receive a higher return on fixed income products such as bonds, savings rates, etc. When the repo rate is low, these types of financial instruments will generate a lower return. More noise traders should therefore move their money to the equity markets when the repo rate is low to earn a higher return. If more rational investors also move from fixed income to equity, the proportion between rational/noise traders could stay the same meaning that the discount stays the same. However, given the assumption that noise traders overreact to news, the noise traders should overreact to these news as well. Any change of the repo rate is nationwide news in Sweden. The potential shift from fixed income to equity should thus lead to enthusiastic noise traders which create a buy pressure on the stock market similar to the pressure created by signals of a strong stock market. We therefore expect the discount to decrease with a lower repo rate.

A secondary effect could though be that the cost of debt decreases if the repo-rate is lowered. In an investment company with leverage, this should lower the total costs which could also reduce the discount, as mentioned in section 2.3.1. This effect should however be highly limited.

H2: The repo rate is positively related with discount to NAV

3.3 Hypothesis Three

The VIX index measures the implied volatility of the American S&P500 stock index. When the implied volatility is high or when the 'fear' is high, we categorize the market as unstable which should lead to pessimistic noise traders and a low noise trader sentiment. Since the Swedish financial market is highly interrelated with the American market, and the Swedish financial magazines, newspapers and news broadcasts have high coverage of the American market, all investors – both rational and noise traders – should incorporate information about the state of the American market. If the American market is weak, the Swedish and European markets are often following the same path. There is an index that measures the implied volatility on the Swedish market called the SIXVX index. However, the SIXVX is not highly recognized, is model dependent and moreover follows the American VIX index closely. Because of this we will use the larger, more established VIX-index in this study. The fear on the American market should be a good proxy for the fear on the Swedish market. In times with high fear or implied volatility the noise trader sentiment should be low leading to higher discounts and lower premiums.

H3: The VIX-index is positively related with discount to NAV

3.4 Hypothesis Four

Positive stock returns are a result of a buy pressure on the stock market. Negative stock returns means there is a sell pressure on the market. When the return of small stocks are higher than the return of the overall market index, the buy pressure on growth stocks are higher than on large stocks. This could be a sign that the expectations on the stock market are high. High return on growth stocks should therefore also mean that the noise trader sentiment is high. Consequently, we expect to find a similar result as Lee, Shleifer and Thaler (1991), namely that the discounts move together with the return on small stocks. But due to the differences in the ownership structure of US closed-end funds and Swedish investment companies we don't expect to find such a strong relationship as they did when measuring the investor sentiment effect. For the sake of comparison, we will test for the same effect.

H4: The abnormal return on small stocks is negatively related with discount to NAV, but the relationship is weaker than in the main test by Lee, Shleifer and Thaler (1991) on US closed-end funds.

4. Data

The unlisted part of the investment companies' portfolios does naturally not have a value determined by the market. Therefore, the value of these parts of the portfolios is more difficult to determine. The Swedish investment companies are obliged by law to publish information about the unlisted part of their portfolios, but this information is associated with two potential problems. Firstly, the investment companies publish the information with different frequency, e.g. some publish weekly information and some publish quarterly information. This is however not a particularly large problem as there are several ways to overcome frequency differences. However, the second problem is that the investment companies use different reporting standards when providing information about their unlisted holdings. This problem is quite comprehensive since the value of different portfolios is not directly comparable to each other.

To avoid this problem we have used data provided by the Nordic bank Nordea. They have used the data provided by the investment companies and recalculated the values making them comparable to each other. With the use of this data we avoid both problems associated with the unlisted holdings. It should be noted that the recalculated values are not recommendations (which could contain a large degree of subjectivity), they only make the values comparable to each other by using the same reporting method. However, the downside of using recalculated data is that it is from a secondary source and it possibly still contains a small degree of subjectivity. This issue is not solvable since the fair historical values cannot be calculated with a reliable method today. Though, the potential subjectivity should be a minor issue since the portfolios are treated in the same way. As long as the subjectivity is vastly limited and the portfolios are comparable, we argue that the data is reliable and suitable for our tests.

Nordea further provided the historical stock price data for the investment companies which is adjusted for stock splits and dividends. The stock prices could have been retrieved from other available sources due to its objective nature. Both the stock prices and NAVs are provided with daily observations. Since the different investment companies have been listed for different amounts of time we do not have the same number of observations for every company. The earliest observation is from 1996 and the latest is from 2015.

Stock market analysts' recommendations and prognoses are compiled and provided by only a few databases. These are mainly Factset, Bloomberg, and Thomson Reuters. These financial data companies are commonly used to provide data in academia, for journalists, and for companies in the financial industry. For the purpose of calculating the Forward-PE for the Stockholm stock exchange, Factset's database has been used. The estimate of forward earnings is an aggregated belief of the collective equity analysts on the Swedish market compiled directly by

Factset. The database provides monthly data of the Forward-PE of the OMXS as a whole and we use a range from September 2006 to March 2015 in our tests. This data is viewed upon as reliable due to the well-renowned status of Factset and their primary method of data collection. The Forward-PE is calculated as:

$$Forward\ PE_t = \frac{\sum_{i=1}^{N} Market\ Capitalization_{i,t}}{\sum_{i=1}^{N} Estimated\ net\ earnings_{i,t+1}} \quad (1)$$

The repo rate changes is gathered directly from the Swedish central bank (The Riksbank) which publishes the new rate directly after they announce an increase or decrease. Between the dates of the changes, the repo rate remains fixed. From this data we have created a database with monthly observations. The first observation in our database is from January 1999 and the latest from 2015. The data we have used in our tests is from September 2006, where we have complete data on all 7 of the investment companies. The data is in both percentage format and decimal format where the decimal format is used for the tests.

The VIX-index is gathered directly from the CBOE (Chicago Board Options Exchange) with daily observations ranging from January 2004 to 2015. The data is smoothed to monthly data from September 2006 to February 2015 and used in the tests. The VIX-index has a range between 10 and 60 during this time period.

For the stock indices we have used Nasdaq OMX Stockholm's own database. Since the stock prices of our investment companies are adjusted for dividends and stock splits we have used General Indices of OMXS, OMXSLargeCap, OMXS MidCap, and OMXS SmallCap for a fair comparison since the General Indices are also adjusted for this. The indices used in the study have daily observations ranging from September 2006 to March 2015 which is smoothed to monthly data.

An overview of the data is provided in Table III in the Appendix.

5. Methodological Approach

We have structured our research in three layers. First we have to analyze if the discount in Swedish investment companies move and fluctuate a lot. This would be a first sign that other factors than firm specific information would impact the discount. It would also be a sign that we have a phenomenon worth to investigate further, since it would be interesting to describe the movements. The second step would be to investigate if the discounts are moving together between the different investment companies. This would give us an implication to if it exist

external market factors that would impact and move the discount for all firms. If we can find comovements for the different companies, we should be able to prove that the discounts are affected by more than firm specifics, and a behavioral explanation would be a good explanation. First when we have proved the comovements, we can enter the third layer and start to investigate how the discounts in all investment companies are related to the same external factors. If we can show that the discounts move together with factors that could be seen as measurement of noise trader sentiment, we could prove that an irrational investment pattern affects the valuation.

Fluctuations are investigated with descriptive statistics, comovement is investigated with correlation tests, and if discounts move together, we will try to explain the phenomenon with regression models.

When choosing which investment companies to perform our tests on we had two criteria to eliminate as much noise as possible: The investment company should be representative and its stocks should not have any illiquidity issues affecting the valuation. If the company is too illiquid we do not always observe the fair market prices[5] and therefore the discounts would not be correctly projected. To meet the two criteria we have chosen to only include investment companies listed on the Large Cap on Nasdaq OMX Stockholm. These are displayed in Table I in the Appendix. What applies on a large company is more likely to also apply on a small company than the other way around. The companies listed on the OMXS Large Cap have a market value of over 1 billion euro and all of them have a high turnover of stocks. There are a total of 7 investment companies that are listed on OMXS Large Cap and they thereby meet our criteria. Therefore they would be a good fit for our study. One of the companies, Ratos, is however different from the others. Ratos is classified as an investment company, but their own description of the company is that they are a private equity conglomerate. Ratos has a strategy that is different from the others with a more active ownership, active acquiring and exit strategy, and a high degree of unlisted holdings. Ratos is one of the largest and early originating investment companies which makes us convinced to keep them in the sample. We want the whole population of Large Cap investment companies, but we are aware of the specific characteristic of Ratos.

The discounts are calculated from the data of price per share, and NAV per share. The discounts are calculated so that a discount valuation is given a positive sign and a premium valuation is given a negative sign.

[5] E.g. the small investment company Creades had a turnover of only 40 stocks 2015-03-12

The formulas to calculate the discounts are:

$$DISC_{it} = \frac{NAV_{it} - SP_{it}}{SP_{it}} \tag{2}$$

$$DISC_{it}\,\% \;=\; DISC_{it} \times 100 \tag{3}$$

Where: $DISC_{it}$ = Discount in decimal format for company *i* in time *t*

NAV_{it} = Net Asset Value per Share for company *i* in time *t*

SP_{it} = Share Price per Share for company *i* in time *t*

We use two different ways to further reduce noise in the data. Firstly we will smooth the data by using only monthly observations instead of daily. This is done by using the observation from the Friday closest to the end of the month. Every observation in the monthly series is thus within 3 days of the last date in the month[6]. Small temporary fluctuations in the data will by this method not be taken into account while more sustainable changes in the variables are captured.

Secondly, if the discounts move together, we create a portfolio that consists of the 7 investment companies. Since we want to be able to explain the fluctuations in every investment company we will create an equally weighted portfolio where every investment company is contributing to equally sized positions. A value weighted portfolio would show the results from the largest investment companies and may neglect the smaller ones. A value weighted approach should therefore work better if the investment companies are more similar in size. Our equally weighted portfolio naturally has the same number of observations as the investment company with the least amount of observations. The portfolio thereby has 2200 daily observations ranging from 5 September 2006 to 4 March 2015 which translates to 102 monthly observations ranging from 29 September 2006 to 27 February 2015. By this, company specific shocks that are affecting the discounts have limited impact. The formula for the calculated portfolio is:

$$EWP_t = \sum_{i=1}^{n_t} \frac{1}{n_t} \times DISC_{it} \tag{4}$$

Where: EWP_t = Equally Weighted Portfolio of discounts in decimal format at date *t*

[6] If any extreme values and potential outliers were found in the new series they were checked against the original series with daily observations for correction. If the values were truthful, no adjustment was done.

Our hypotheses will be tested with regression tests. We will use OLS-regressions to test the relationships that we have described in section 3.1, 3.2, 3.3 and 3.4. The formulas for the different regression models are:

Hypothesis 1, Regression 1: Forward-PE and Discounts

$$DISC_t = \beta_0 + \beta_1 \times ForwardPE_t + \varepsilon_t \quad (5)$$

Hypothesis 2, Regression 2: Repo rate and Discounts

$$DISC_t = \beta_0 + \beta_1 \times Reporate_t + \varepsilon_t \quad (6)$$

Hypothesis 3, Regression 3: CBOE VIX and Discounts

$$DISC_t = \beta_0 + \beta_1 \times CBOEVIX_t + \varepsilon_t \quad (7)$$

Hypothesis 4, Regression 4: Return OMXS indices and Delta Discounts

$$ReturnSmallCapOMXSGI_t = \beta_0 + \beta_1 \times \Delta DISC_t + \beta_2 \times ReturnAllShareOMXSGI_t + \varepsilon_t \quad (8)$$

$$ReturnMidCapOMXSGI_t = \beta_0 + \beta_1 \times \Delta DISC_t + \beta_2 \times ReturnAllShareOMXSGI_t + \varepsilon_t \quad (9)$$

$$ReturnLargeCapOMXSGI_t = \beta_0 + \beta_1 \times \Delta DISC_t + \beta_2 \times ReturnAllShareOMXSGI_t + \varepsilon_t \quad (10)$$

We will do the regression tests for both the fictive portfolio and for all individual investment companies. We will further analyze the regressions with scatter plots to get a better understanding of the relationships. Since OLS regressions are sensitive to outliers, a sensitivity test of the regressions is done by excluding extreme values.

6. Results

6.1 Fluctuations in Discount

To answer if and how the discounts to NAV fluctuate in the Swedish investment companies we use descriptive statistics in Table 1. First to be noted is that in five of seven investment companies the mean discount have been around 20%. Only two companies, Ratos and Melker, have an average valuation that is on premium. Interesting to notice is that over the whole time period only Ratos, Melker and Kinnevik have had a premium valuation. The other four companies have constantly been valued at a discount. Ratos is the company that has been most volatile in its valuation with a range of over 116 percentage points, at highest at a premium of 74% and at lowest at a discount of 42%. Our other companies have also been volatile, with

Industrivärden, Investor, Latour and Lundberg fluctuating between valuations of a few percent discounts to discounts over 30% at most.

The most important statistic to answer how much the relative valuations to NAV have been fluctuating is the standard deviation. Most investment companies have a standard deviation in its discount of 5-6%. Kinnevik and Ratos have higher levels of 12% and 28% respectively. This means that the discounts in Swedish investment companies have considerable fluctuations over time.

Table 1: Descriptive Statistics of Discount to NAV in Investment Companies

Table 1 shows descriptive statistics for our seven Swedish investment companies. The data consists of daily observations of the discount to NAV, calculated by formula 2 with Share prices and NAV. The time-period is Jan 1997 to Feb 2015. The differences in number of observations are because of all firms have not been listed on the stock exchange for the whole period. Source: Nordea Markets Division Equities investment company data.

	Indust	**Invest**	**Kinnev**	**Latour**	**Lundbe**	**Ratos**	**Melker**
Statistics							
mean	0.2500	0.2880	0.2552	0.1603	0.1921	-0.0663	-0.0019
N	4724	4725	3662	2355	3643	4725	2200
max	0.4378	0.4318	0.4691	0.3659	0.3840	0.4213	0.1202
min	0.1340	0.1300	-0.3474	0.0149	0.0623	-0.7430	-0.1652
range	0.3038	0.3018	0.8165	0.3510	0.3217	1.1642	0.2853
sd	0.0559	0.0621	0.1210	0.0663	0.0491	0.2809	0.0532

6.2 Correlation between Investment companies

Correlation tests in Table 2 show whether the discounts move together between firms or not. In our population of the seven Large Cap investment companies, all are positively correlated with each other except from Ratos. The other six investment companies are all positively correlated at high significance level. The p-values for a two-tailed test of zero correlation are below 1% for all 15 different correlation tests. The average correlation between these firms is 0.3618. This significant comovement between discounts justifies the construction of a portfolio of investment companies with an average discount. Ratos is the outsider which relative valuation to NAV moves differently from the others. It is both positively and negatively correlated with other companies, and the correlations are not significantly different from zero at any higher level.

When testing the correlation between the different companies and an equally weighted portfolio of the investment companies (EWP) we can see that all companies are

significantly correlated to the equally weighted portfolio with a positive sign. The average correlation is 0.5368. An equally weighted portfolio will thus well represent the movement of the Swedish population of Large Cap investment companies. Ratos is as mentioned above an outsider that will affect the value because of the small population. When creating an equally weighted portfolio of the remaining six companies by excluding Ratos (EWP-R) we have a portfolio that very well represents these six companies. The average correlation of the six companies with the portfolio excluding Ratos is 0.6845. All six investment companies' discounts are thus highly correlated with the discount in this portfolio.

This test gives evidence that the discount in all investment companies except Ratos tend to move together. Further, the test shows that the movements in discounts are not explained by solely firm-individual factors, but also by factors that affect all investment companies as a group.

Table 2: Correlation of Monthly Discounts of All Seven Investment Companies

Table 2 shows the correlation of level of discounts at month's end of all seven investment companies and the discount of 2 equally weighted portfolios, EWP and EWP-R where the latter excludes Ratos. The time period is Oct 2006 to Feb 2015, the time period when all investment companies have been listed on the stock exchange. The first value is the correlation between firms and is calculated with pairwise Pearson product-moment correlation, the second value is p-value for a two-tailed test with a null-hypothesis of zero correlation, and the third value is number of observations. Source: Nordea Markets Division Equities investment company data

	Indust	**Invest**	**Kinne**	**Latour**	**Lundbe**	**Ratos**	**Melker**	**EWP**	**EWP-R**
Indust	1								
	101								
Invest	0.3783	1							
	0.0001								
	101	101							
Kinne	0.3319	0.4488	1						
	0.0007	0							
	101	101	101						
Latour	0.2907	0.4285	0.3492	1					
	0.0032	0	0.0003						
	101	101	101	101					
Lundbe	0.4096	0.3969	0.3766	0.4902	1				
	0	0	0.0001	0					
	101	101	101	101	101				
Ratos	-0.2174	-0.1785	-0.0563	0.0247	0.0227	1			
	0.0290	0.0741	0.5759	0.8060	0.8219				
	101	101	101	101	101	101			
Melker	0.2619	0.3308	0.2735	0.3061	0.3541	0.0631	1		
	0.0081	0.0007	0.0057	0.0018	0.0003	0.5304			
	101	101	101	101	101	101	101		
EWP	0.3638	0.4879	0.7082	0.5932	0.5966	0.4889	0.5188	1	
	0.0002	0	0	0	0	0	0		
	101	101	101	101	101	101	101	101	
EWP-R	0.5515	0.6692	0.8452	0.6633	0.6684	-0.0628	0.5543	0.8399	1
	0	0	0	0	0	0.5325	0	0	
	101	101	101	101	101	101	101	101	101

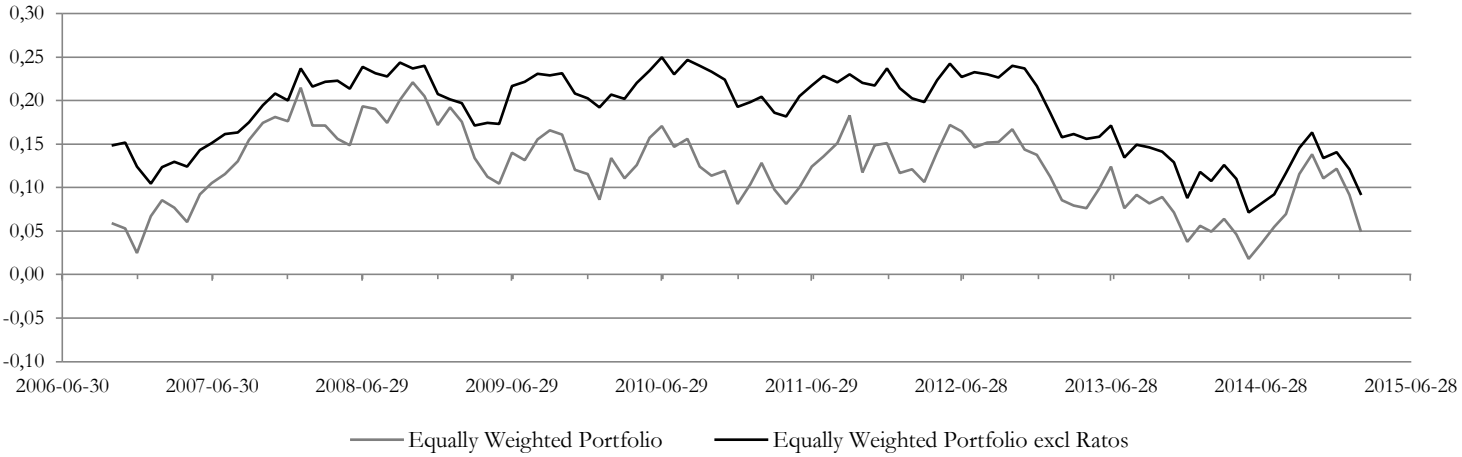
6.3 Movement of discounts

Diagram 1 shows us how the two created portfolios of discounts (EWP and EWP-R) have moved during the past 8.5 years. First it shows that the two portfolios move together. The correlation is 0.8399 between the two. Since Ratos is that much of an outsider we want to include both a portfolio with all investment companies and one where Ratos is excluded. The portfolio without Ratos has a higher discount (5-10 percentage points higher) and is to some extent less volatile. However, both portfolios are good representatives of how the population of discounts moves.

The diagram can be used to try to understand the movements in the discount. Though, it is hard to find any obvious patterns. The discounts are high in the end of 2008 then gets lower during the first half of the following year. However, we see no jumps or other deviating movements at the time period around 2008-2009 where the global financial crisis erupted. Another noteworthy observation is the large decrease in discounts between the start of 2013 to the middle of 2014.

Diagram 1: Movement of Equally Weighted Portfolios of Discounts

Diagram 1 shows the movements of discounts of two equally weighted portfolios. In the portfolio marked in grey, all seven investment companies are included. In the portfolio marked in black, the company Ratos is excluded. Date is on the x-axis, and discount in decimals is on the y-axis. The time period is Oct 2006 to Feb 2015. The data used is monthly data. Source: Nordea Markets Division Equities investment company data



When evaluating the discounts all the way back from 1997 (see Table V in appendix) we can find that the discounts on average where higher in the first ten years, and later when more investment companies were entering the market again, the discount decreased. Between 1997 and 2003 the

average discount in the investment companies was never below 20% measured annually and the maximum average discount was 37%. The last years the discounts have been historically relatively low. Between 2007 and 2012 the average discount has been between 10% and 20% and after 2012 it has been below 10%.

We could also evaluate if the discounts have been fluctuating more and been more unstable in some time periods. The standard deviations each year are between three and six percentage points (see table IV in Appendix.). It is though hard to find any clear pattern that the discounts are more stable in some years. You can see that the discounts do fluctuate relatively much during the financial crisis, when the market was less stable. Year 2007, 2008 and 2009 have higher standard deviation in the discounts.

6.4 Explaining the movements

Table 3 shows that the NAV and share prices are extremely correlated with each other, as can be expected. At average for the seven investment companies the correlation between share prices and NAV is 0.9683. In a rational world the correlation should be very close to 1.00. But this gives no obvious explanations to why share prices move differently from NAV and therefore could explain all the movements in discounts. When testing for the correlation between discounts and share prices the average correlation is -0.4420. This is interesting since it means that when share prices increases discount on average decreases. Correlation tests for discounts with NAV results in an average of -0.2485. This means that when NAV increases discount on average decreases. These results imply that when the NAV increases the share price has to increase even more. It also has to mean that the discounts are more correlated with share prices than with the NAV. This implies that there exist external factors that impact the share price more than the NAV.

Table 3: Correlation Discounts, Share Prices and NAV for All Seven Investment Companies

Table 3 below shows the correlation between Discount, Price/Share and NAV/Share. The data uses monthly observations between Oct 2006 and Feb 2015. Number of observations are 102 for all companies. Source: Nordea Markets Division Equities investment company data

		Discount	Price/Share	NAV/Share
Industrivärden	**Discount**	1		
	Price/Share	-0.3933	1	
	NAV/Share	-0.1300	0.9594	1
Investor	**Discount**	1		
	Price/Share	-0.5111	1	
	NAV/Share	-0.3550	0.9823	1
Kinnevik	**Discount**	1		
	Price/Share	-0.6297	1	
	NAV/Share	-0.2986	0.9232	1
Latour	**Discount**	1		
	Price/Share	-0.2040	1	
	NAV/Share	-0.0565	0.9874	1
Lundbergs	**Discount**	1		
	Price/Share	-0.2194	1	
	NAV/Share	-0.0771	0.9880	1
Ratos	**Discount**	1		
	Price/Share	-0.7491	1	
	NAV/Share	-0.5282	0.9445	1
Melker	**Discount**	1		
	Price/Share	-0.3873	1	
	NAV/Share	-0.2938	0.9935	1
Average	**Discount**	1		
	Price/Share	-0.4420	1	
	NAV/Share	-0.2485	0.9683	1

6.5 Regression tests

Since all observed effects in sections 6.1 through 6.4 indicates that there are factors affecting all investment companies as a group we can test our hypotheses that noise trader expectations and sentiment, measured by specific market factors, can explain the discount.

6.5.1 Forward-PE and discounts

The regression tests tell that Forward-PE and the level of the discount both for an equally weighted portfolio and one excluding Ratos are statistically significantly related to each other on the highest level with a negative sign. The p-values for the null-hypotheses are below 0.001. A one unit increase in Forward-PE leads to a decrease in discount with 1.1 (EWP-R) to 1.3 (EWP) percentage points. The Forward-PE has been fluctuating from 9 to 19 since 2007. The standard deviation has been 2.2 (Table VI appendix). This means that one standard deviation increase in Forward-PE almost creates a decrease with 3 percentage points in the discount. This is an economically significant impact since standard deviations for the discounts are often 5-6 percentage points (Table 1). Therefore we see a clear pattern that when the valuations of expected forward earnings are high overall on the Stockholm Stock exchange, the discounts are lower.

For some of the specific Investment companies we have significant relations between Discount and Forward-PE. The range is a 0.1 to 3.4 percentage point decrease in discounts for a one unit increase in Forward-PE, all coefficients have the same negative sign. When evaluating the R-squared values they are low for all individual firms, but increase up to 0.3-0.4 when we use our created portfolios with less noise in the data.

Table 4: Regression Results Discount and Forward-PE

Table 4 shows the regression results with OLS-regression, robust standard errors. Regressions are between level of discounts at month end and Forward-PE on Stockholm stock exchange, Nasdaq OMXS. Time period is Oct 2006 to Feb 2015. Sources: Nordea Markets (discounts), Factset (Forward-PE)

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
ForwardPE	-0.0127***	-0.0112***	-0.00171	-0.00968***	-0.0336***	-0.0121***	-0.00755**	-0.0222**	-0.00237
	(-5.89)	(-4.89)	(-1.03)	(-5.05)	(-5.17)	(-4.05)	(-2.77)	(-3.25)	(-0.87)
_cons	0.298***	0.340***	0.240***	0.419***	0.713***	0.334***	0.304***	0.0411	0.0320
	(10.57)	(11.78)	(10.75)	(15.31)	(8.92)	(8.13)	(8.05)	(0.41)	(0.90)
N	102	102	102	102	102	102	102	102	102
R^2	0.382	0.283	0.011	0.265	0.248	0.170	0.121	0.081	0.010

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

When evaluating the regression of the equally weighted portfolios with scatter plots, (Diagram I and II in the Appendix) we observe a pattern that for the largest values of Forward-PE the discount behaves differently. Therefore if we exclude the six largest observations where Forward-

PE is above 17 we get R-squared values of 0.601 and 0.493 for our equally weighted portfolio and the one excluding Ratos respectively. The coefficients in the regressions become a little higher with a 1.8 and 1.6 percentage point decrease in discount from one unit increase in Forward-PE (Table VII in the Appendix). This strongly argues that we have a clear relationship between Forward-PE and discounts.

6.5.2 Repo rate and discounts

The repo rate is statistically significantly related to the equally weighted portfolio. One percentage points increase in the repo rate creates 1.3 percentage points increase in discounts. But in this case we can see that Ratos affects the portfolio to a high grade. Ratos' firm specific discount has a high value in the regression coefficient, 4.8. This means that a portfolio without Ratos is less related to the repo rate, where a one unit repo rate increase leads to 0.7 unit increase in discount. This is still significant at a lower level. The p-value is below 0.05. The repo rate has been ranging from 4.75% to -0.10% during our sample period. A one percentage point jump in the repo rate is quite large but could happen. The standard deviation is 1.4 percentage points. This means that the repo rate has a relation to the discounts. In times when the repo rate is high the discounts are also higher. But the regression models here have very low R-Squares telling that these models can just explain a very small part of the variation in discounts. All firm specific regressions, except Latour have a positive sign in the regression coefficient. The firm specific regressions are mostly not statistically significant and the R-squares are low, below 0.1 or slightly over.

Table 5: Regression Results Discount and the Repo Rate

Table 5 shows the regression results with OLS-regression, robust standard errors. Regressions are between level of discounts at month end and the repo rate in Sweden, determined by the Swedish Central Bank, the Riksbank. Time period is Oct 2006 to Feb 2015. Sources: Nordea Markets (discounts), The Riksbank (repo rate)

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
Repo rate	1.253***	0.654*	0.214	0.0575	3.531***	-0.433	0.516	4.848***	0.0391
	(4.15)	(2.12)	(0.78)	(0.22)	(4.67)	(-0.86)	(1.14)	(4.35)	(0.11)
_cons	0.100***	0.175***	0.213***	0.284***	0.189***	0.174***	0.191***	-0.347***	-0.00145
	(16.38)	(23.03)	(32.53)	(52.09)	(7.58)	(19.53)	(26.87)	(-13.99)	(-0.16)
N	102	102	102	102	102	102	102	102	102
R^2	0.141	0.037	0.007	0.000	0.104	0.008	0.022	0.147	0.000

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

When analyzing the scatter plots over the regressions with our portfolios and the repo rate interesting is that we see two different patterns with rates below or above 2.5% (Diagram III and IV in the Appendix). Below 2.5% we see a somewhat more unclear pattern of increasing discounts with increasing repo rate. Just over 2.5% the discount jumps back to a low level and again increases with an increasing repo rate in a clearer pattern. It is difficult to draw a certain conclusion for the relationship between discount and repo rate, but the regression results and the scatter analysis tell us that it is a weak evidence of that with increasing repo rate the discounts also increase.

6.5.3 CBOE VIX and discounts

Both the discount for the equally weighted portfolio and the one excluding Ratos are related to the VIX. One unit increase in VIX would give an increase in discount in our portfolios of 0.33 (EWP) and 0.26 (EWP-R) percentage points. The VIX has during the time period been in a range from 10 to 60, with a standard deviation of 9.4. One standard deviation change in the VIX would give approximately 3 percentage points change in discount. The relationship is clear, when we see a lot of fear in the market, the implied volatility or the VIX index is high, and the discount is high.

For five of seven investment companies we have statistically significant results in the firm specific regressions. Every regression have equal signs and reasonable coefficients between 0.001 which is lower than in the portfolios and up to 0.007 which is higher than in the portfolios.

Table 6: Regression Results Discount and CBOE VIX

Table 6 shows the regression results with OLS-regression, robust standard errors. Regressions are between level of discounts at month end and the CBOE VIX. Time period is Oct 2006 to Feb 2015. Sources: Nordea Markets (discounts), Chicago Board Options Exchange (CBOE VIX).

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
CBOEVIX	0.00326***	0.00261***	0.000560	0.000897	0.00736***	0.00346***	0.00216***	0.00717***	0.00124*
	(9.83)	(5.67)	(1.20)	(1.72)	(5.19)	(5.04)	(3.68)	(5.43)	(1.99)
_cons	0.0513***	0.130***	0.204***	0.266***	0.0903*	0.0924***	0.153***	-0.419***	-0.0273
	(6.32)	(11.97)	(21.27)	(22.14)	(2.41)	(6.49)	(12.91)	(-12.64)	(-1.85)
N	102	102	102	102	102	102	102	102	102
R^2	0.461	0.285	0.022	0.042	0.218	0.258	0.181	0.155	0.047

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

When analyzing the scatter plot we can see that for the highest values on the VIX, (VIX > 30) the discounts behave differently (Diagram V and VI in the Appendix). If we redo our regressions, but exclude the observations when VIX is above 30, we get higher values on the VIX-coefficient and equal or an even higher R-square. With this adjustment the coefficient becomes close to 0.006 and 0.007 for our portfolios (Table VIII Appendix). A one standard deviation change in VIX would give around one standard deviation change in discount. This is test provides a strong evidence of that VIX is positively related to discounts.

6.5.4 Return OMXS indices and delta discounts

This test is a replication of the test performed by Lee, Shleifer and Thaler (1991) but on the Swedish market. Both our portfolios give equal results. The changes in discounts are negatively related to the abnormal returns by Small Cap GI. When Small Cap performs better than they use to do, compared with the overall market, the discounts decrease. For our equally weighted portfolio it is not a statistically significant result. For the portfolio without Ratos the p-value is 0.065 so it is close to being statistically significant. The model tells that when holding the overall market fixed, and having a one percentage point drop in discount, the Small cap faces an excess return of 0.209% (EWP) or 0.464% (EWP-R). Interesting is that we find a higher impact and higher statistical significance when we test for Mid Cap GI. When Mid Cap GI performs better than overall market we see a decrease in discount. But this is not very strange since Small Cap and Mid Cap often move quite similarly on the Swedish market. When testing for Large Cap it is already very close to the overall general index but we find that when large cap performs better than general index the discount increases. This implies that when Large Cap performs better, Small Cap and Mid Cap underperform the market index which leads to an increase in discount. This indicates that the model works.

So when we compare with the research on US Closed-end funds we do not find such a clear pattern as Lee, Shleifer and Thaler (1991) does. We still find weak evidence that when groups of smaller stocks have a higher return than they are expected to, the discounts decreases. We can observe the same tendency that when investors are optimistic for Small-Cap and Mid-Cap stocks and investment companies these stocks do well and discounts narrow. When investors are pessimistic for Small-Cap and Mid-Cap stocks and investment companies, these do worse and discounts widen. The relationship between over-performance of totally different stocks and discount of investment companies is evidence for that market sentiment has impact on the discount valuation. However, this evidence is substantially weaker than in Lee, Shleifer and Thaler's (1991) study of US closed end funds.

Table 7: Regression Results Return OMXS Indices and Delta Discounts

Table 7 shows the regression results with OLS-regression, robust standard errors. Regressions are between the monthly return on different General Indices on Stockholm Stock Exchange Nasdaq OMXS, the change in discount each month, and the monthly return on the all shares General Index OMXSGI. Time period is Nov 2006 to Feb 2015. Sources: Nordea Markets (discounts), Stockholm stock exchange Nasdaq OMXS (stock indices).

	(1) Ret OMXS SmallCap GI	(2) Ret OMXS MidCap GI	(3) Ret OMXS LargeCap GI
Delta EWP Discount	-0.209	-0.249	0.0197
	(0.204)	(0.094)	(0.257)
Ret OMXSGI	0.755***	0.897***	1.012***
	(0.000)	(0.000)	(0.000)
_cons	0.00116	0.00246	-0.0000876
	(0.763)	(0.413)	(0.799)
N	100	100	100
R^2	0.598	0.760	0.996

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(1) Ret OMXS SmallCap GI	(2) Ret OMXS MidCap GI	(3) Ret OMXS LargeCap GI
Delta EWP-R Discount	-0.464	-0.489*	0.0514*
	(0.065)	(0.010)	(0.012)
Ret OMXSGI	0.748***	0.898***	1.014***
	(0.000)	(0.000)	(0.000)
_cons	0.000979	0.00219	-0.0000755
	(0.796)	(0.452)	(0.822)
N	100	100	100
R^2	0.609	0.770	0.996

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6.6 Summary results

When analyzing the results we can answer our hypotheses and working questions:

1. The discount fluctuates much in all investment companies.

2. The discounts move together in all investment companies except Ratos.

3. The factors that affect the valuation of the investment companies are mainly Forward-PE, where the valuation of share prices over forward expected earnings are negatively related to discounts, and the 'fear' in the market measured by CBOE VIX, which is positively related to discounts. The repo rate is weaker, but positively related to discounts. Small-Cap and Mid-Cap abnormal return over their expected movement with the market index are weakly negatively related to discounts.

7. Robustness

7.1 Multivariate Regressions

If doing a multivariate regression with all our three test variables Forward-PE, Repo rate and CBOE VIX, we get a more advanced regression model. By this test we can see the impact from one of our variables by holding the other two fixed. The result of this regression is that the conclusion from 6.5.1 and 6.5.3 holds, that Forward-PE is negatively related to the discount, and the CBOE VIX is positively related to the discount. The model tells that the impact from the repo rate is harder to decide (Table 8).

The Forward-PE is still negatively related to both portfolios, and with all individual firms except Ratos. The coefficient in the portfolios are lower than in the original regressions, now -0.00698 (EWP) and -0.01 (EWP-R) compared to -0.0127 and -0.0112 in the original test. The repo rate had in the original regressions positive sign in all regressions except Latour. In the multivariate regression one portfolio is positively related and one is negatively, four of the individual firms are negatively related and one is positive. Only the portfolio without Ratos gets significant results at the lowest level. This result is negative with a one percentage point increase in repo rate leading to 0.5 percentage points decrease in discount. This finding argues against the conclusion in section 6.5.2. The CBOE VIX is still significantly positively related to discounts. The coefficients from the original regressions that are 0.00326 (EWP) and 0.00261 (EWP-R) now decrease to 0.00248 and 0.00171. All individual firms with significant coefficients have positive signs.

The values of the coefficients are lower than in the original regressions since they now explain some parts of the discounts together. But Forward-PE and CBOE VIX still have coefficients that are of economic significance. The conclusion from this multivariate regression is that Forward-PE and CBOE VIX still are strongly related to the discounts. The repo rate's relation is harder to draw a conclusion about. It does not have such a clear impact as the other two variables.

The multivariate regression is a powerful tool, but in our research when we want to investigate the relationship between discounts and other market sentiment variables, we think our original regressions together with detailed scatter analysis is a better way. Therefore we have the multivariate regression as a robustness test. A complete regression model that could describe everything in the discount would be extremely complex to create. With our original method we can show a clear and understandable relationship with less complexity.

Table 8: Multivariate Regressions with Discounts

Table 8 shows the regression results with multivariate regression, robust standard errors. Regressions are between level of discounts at month end and the Forward-PE, Repo rate and CBOE VIX. Time period is Oct 2006 to Feb 2015. Sources: Nordea Markets (discounts), Factset (Forward-PE), The Riksbank (repo rate), Chicago Board Options Exchange (CBOE VIX).

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
ForwardPE	-0.00698**	-0.0100***	-0.000246	-0.0165***	-0.0206**	-0.0169***	-0.00506	0.0113	-0.000762
	(-2.99)	(-3.48)	(-0.11)	(-6.89)	(-3.01)	(-4.85)	(-1.55)	(1.51)	(-0.20)
Repo rate	0.278	-0.543*	0.134	-1.555***	0.899	-2.389***	-0.177	5.199***	-0.169
	(0.99)	(-1.99)	(0.40)	(-5.48)	(1.31)	(-5.38)	(-0.36)	(3.69)	(-0.38)
CBOEVIX	0.00248***	0.00171**	0.000504	-0.000445	0.00504**	0.00226**	0.00168**	0.00715***	0.00120
	(6.02)	(3.10)	(0.97)	(-0.89)	(3.15)	(2.64)	(2.82)	(4.95)	(1.67)
_cons	0.160***	0.297***	0.206***	0.549***	0.411***	0.392***	0.236***	-0.661***	-0.0131
	(4.01)	(6.14)	(5.54)	(13.50)	(3.40)	(6.48)	(4.35)	(-4.92)	(-0.20)
N	102	102	102	102	102	102	102	102	102
R^2	0.591	0.409	0.026	0.421	0.328	0.454	0.215	0.270	0.048

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

7.2 Comovement during and after times of crisis

If we divide the original time period into two parts and redo our tests we can control for potential time biases. Furthermore, since our original period includes the financial crisis of 2008 we can see how well our models work during times of extreme uncertainty on the financial markets. Period A ranges from Sep 2006 to Dec 2010 and captures the financial crisis and turbulent years around 2008-2009. Period B ranges from Jan 2011 to Feb 2015 and stands for a calmer time period with less panic at the financial markets. Though, one should note that Period B will include the increasingly turbulent years around 2011-2012 because of the Euro crisis. However, we argue that this turbulence is not as severe as during 2008-2009.

When testing both our portfolios of discounts against the Forward-PE we can immediately see that during Period A the regression using Forward-PE as independent variable has a lower impact on discounts than before with a coefficient of -0.0101 (EWP) and -0.0042 (EWP-R). The sign is still negative and coefficients are significant at the 5% level. This regression has a lower R-Squared of 0.318 (EWP) and 0.077 (EWP-R) compared to the original period (Table IX in the Appendix). Though, during Period B the Forward-PE coefficient has a greater

impact on discounts than in the original time series with the right sign and a p-value of 0.001. The R-Squared of the Period B test is 0.685 (EWP) and 0.863 (EWP-R). The regression results for Period B are displayed in Table X in the Appendix. This shows that the Forward-PE is better at explaining the discounts in calmer times than in turbulent times but that the model holds in both scenarios.

The same tests as we do with Forward-PE we also do with CBOE VIX and make regressions for a time period before 2011 and one after 2011. We test the regressions for the portfolios of discounts using CBOE VIX as the independent variable. All results for the two portfolios are statistically significant in both Period A and B. During Period A we can see that the impact from changes in VIX is lower than during the whole period. One unit increase in VIX is related with 0.283 (EWP) and 0.181 percentage points (EWP-R) increase in discounts. The R-squared is 0.447 and 0.259 in period A. In Period B instead the impact is a little bit higher then for the whole period with 0.419 (EWP) respectively 0.487 (EWP-R) percentage points increase for one unit increase in VIX. The R-squared is similar as before 0.360 and 0.308. This shows that the models work quite similar in both periods. In the more turbulent Period A we can see that the change in VIX had a little less impact on discounts than changes in VIX have had in more calmer times. The VIX changed more with larger moves and more extreme values in the turbulent time which could describe the less impact from one unit change. But still we see a clear relationship for both periods that when the VIX and the fear is high in the market the discounts are also bigger.

8. Conclusions

We can conclude that firm specific characteristics such as cost structure, agency problems, taxes etc. does not solely explain the discounts to NAV in Swedish investment companies. We find strong evidence that quite a large part of the discounts can be explained with market factors, specifically the Forward-PE measure and the VIX-index which should serve as good measures of noise trader sentiment. Our hypotheses state that noise traders should overreact to both positive and negative news about the firms and the overall market, which should lead to fluctuations in the discount because of the double noise trader effect in the investment companies. The evidence presented in this study is in line with our hypotheses.

As mentioned in section 2.3, most firm-specific characteristics have trouble to explain the fluctuations in discounts. Though, the rational explanation associated with the agency cost characteristic originally developed by Boudreaux (1973) comes close to explaining these fluctuations. If investors believe that the investment company will make better investments in the

future it should be traded at premium and if they believe it will make worse investments it should be traded at a discount. As expectations change, so does the relative valuation to NAV.

However, while this seems like a plausible explanation, few researchers have been able to find evidence for this type of agency cost after Boudreaux (1973). Further we find that discounts change with good or bad states of the market. The likelihood for changes in rational expectations to correlate with the states of the market is quite low since rational investors should have the same perception of the management team regardless of the state of the overall market. If rational expectations however would change with the market, we should see an opposite effect with lower rational expectations of future investments in good states since the asset prices are high and it thereby is harder to find good investment opportunities. Therefore, the existing rational explanations displayed in section 2.3 are less likely to explain our findings.

This study can prove that discounts move together with measures that we argue should be good estimators of noise trader sentiment. Thereof we draw the conclusion that noise traders do affect the relative valuation to NAV. This explanation and our accepted hypotheses are the only ones consistent with the evidence provided in this study and shows why the discounts fluctuate so vastly.

Multivariate tests (multiple variable regressions) do not give a better explanation, which shows that noise trader sentiment only explains part of the discount, not everything. Including more measures of sentiment will not explain more of the discounts. The rest is explained by something else.

Earlier research and theories describe how complex it is to explain the discount valuation and its fluctuations. Firm specific factors possibly have great impact. We can with our research not describe the different levels of discount between firms, but we can contribute with an understanding of the overall level of the discount and the fluctuations in discount with our explanation of noise trader sentiment. When noise traders are optimistic the discount is lower and when they are pessimistic the discount is higher.

Earlier research in the area is mostly accomplished through using only firm specific characteristics and trying to describe the discount with one large complex model. We argue that when creating this type of model it is very important to control for the noise trader sentiment. If including this important factor the model should be more accurate and detailed. If excluding noise trader sentiment the model would have difficulties to describe the changing level of discounts over time.

For future research we suggest that an interesting topic would be to include a noise trader variable in more classical firm specifics models. We also think that it would be possible to

do a more advanced investigation of how noise trader sentiment impacts the discount. It should be possible to create an even better measurement of noise trader sentiment, and it should also be possible to split the sentiment into more detailed divisions or groups of noise traders. This would create a way to understand in even greater detail why the discount moves as it does.

To the Swedish investment companies our research proves how exposed they are to noise trader sentiment. In good times when noise traders are optimistic the valuation of investment companies should be high, and they would be safer from take overs and it would be less costly to bring in new capital. But in pessimistic time they will be valued low and the risk to be acquired, broken up and sold off is higher. Without a strategy that would create unique additional value and complicate the valuation and accessibility to assets the problem with discount will remain.

References

Barclay, Michael J., Clifford G. Holderness, and Jeffrey Pontiff, 1993, Private benefits from block ownership and discounts on closed-end funds, *Journal of Financial Economics* 33, pp. 263-291

Boudreaux, K. J., May 1973, Discounts and premiums on closed-end investment companies: A study in valuation, *Journal of Finance* 28, pp. 515-522

Brauer, Gregory A., 1984, Open ending closed-end funds, *Journal of Financial Economics* 13, pp. 491-507

Brickley, James A. and James S. Schallheim, 1985, Lifting the lid on closed-end investment companies: A case of abnormal returns, *Journal of Financial and Quantitative Analysis* 20, pp. 107-118

De Long, J. Bradford, Andrei Shleifer, Lawrence H. Summers, and Robert J. Waldmann, Aug. 1990, Noise Trader Risk in Financial Markets, *Journal of Political Economy* 98, pp. 703-738

Grossman, Sanford J., and Oliver D. Hart, 1980, Takeover Bids, The Free-Rider Problem, and the Theory of the Corporation, *Bell Journal of Economics* 11, pp. 42-64

Hjelström, Tomas, Jun. 2007, The Closed-End Investment Company Premium Puzzle, PhD-thesis EFI, The Economic Research Institute, Stockholm School of Economics

Investment Company Act of 1940, Amended through P.L. 112-90, approved Jan 2012

Karlsson, Arne, Jan 1999, Svarta lådan – Om substansrabatten, (Swedish), *Ratos AB*, available at: http://ratos.se/Om-Ratos/Ratos-som-agare/Svarta-ladan/ [7 May 2015]

Kumar, Raman, and Gregory M. Noronha, Summer 1992, A Re-examination of the Relationship between CEF Discounts and Expenses, *Journal of Financial Research* 15, pp. 139-147

Lee, Charles M. C., Andrei Shleifer, and Richard H. Thaler, March 1991, Investor Sentiment and the Closed-End Fund Puzzle, *Journal of Finance* 46, pp. 75-109

Lönnqvist, Rune, Per Arvidson, Caisa Drefeldt, Sigurd Hansson, Hans Lindquist, Christer Peterson, Eva Törning, 2013, first edition, Redovisning och Finansiering: kurs 302 (Studentlitteratur AB, Lund, Sweden)

Malkiel, Burton G., Jun. 1977, The Valuation of Closed-End Investment-Company Shares, *Journal of Finance* 32, pp. 847-859

Roenfeldt, Rodney L. and Donald L. Tuttle, 1973, An examination of the discounts and premiums of closed-end investment companies, *Journal of Business Research Fall*, pp. 129-140

SFS 1999:1229. Inkomstskattelag. (Law of income taxes) Stockholm: Department of Justice

Appendix

Table I: List of Investment Companies and Characteristics

Table I shows the investment companies in this study, when they were listed on the Stockholm stock exchange, and how large the listed fraction of the portfolios is. Source: Nordea Markets Division Equities investment company data.

Company	Listed	Listed fraction of portfolio*	Nature
Industrivärden AB	<1996	100%	Pure
Investor AB	<1996	73%	Impure
Investment AB Kinnevik	2001	76%	Impure
Latour AB	2006	74%	Impure
L E Lundbergföretagen AB	2001	77%	Impure
Ratos AB	<1996	12%	Impure
Melker Schörling AB	2006	100%	Pure

*Based on Net Asset Values, 27 Feb 2015

Table II: Institutional Owners in Swedish Investment Companies

Table II displays the fraction of institutional investors in the investment companies in this study. Owner families are included as institutional owners because of their size and nature. Source: Official websites of the respective investment companies

	Institutional owners*	
Company	% of capital	% of votes
Industrivärden AB	47.0	67.7
Investor AB	45.4	68.0
Investment AB Kinnevik	43.1	71.9
Latour AB	82.8	85.8
L E Lundbergföretagen AB	61.4	91.8
Ratos AB	43.8	76.3
Melker Schörling AB	88.9	88.9
Average	58.9	78.6

* Based on reported values, 6 May 2015

Table III: Data Overview

Table III is an overview of the data used in this study. Sources: Nordea Markets (discounts), Nasdaq OMXS (stock indices), Factset (Forward-PE), The Riksbank (repo rate), Chicago Board Options Exchange (CBOE VIX).

	Source	Frequency of obs	Nature of source	Range	Manipulation
Net Asset Values	Nordea Markets	Daily	Secondary	1996*-2015	Recalculated
Share prices	Nordea Markets	Daily	Secondary	1996*-2015	Adjusted for stock splits & dividends
OMXS Indices	Nasdaq OMX Stockholm	Daily	Primary	2006-2015	None
Forward-PE	Factset	Monthly	Secondary	2006-2015	Aggregated data from several sources
Repo rate	Swedish Central Bank	Monthly	Primary	2006-2015	None
VIX-index	CBOE	Monthly	Primary	2006-2015	None

*The range differs between investment companies depending on how long they have been listed

Table IV: Standard Deviation for All Seven Investment Companies for All Years

Table IV shows the standard deviation for all Swedish investment companies all years. The data is based daily obervations and the discounts are calculated with Share prices and NAV. The time-period is Jan 1997 to Feb 2015. The differences in number of observations are because of all firms have not been listed on the stock exchange for the whole period. Source: Nordea Markets Division Equities investment company data

	Indust	Invest	Kinne	Latour	Lundbe	Ratos	Melker	Average	Ranking
Year									
1997	0.0206	0.0297				0.0307		0.0270	19
1998	0.0364	0.0686				0.0309		0.0453	8
1999	0.0175	0.0424				0.0238		0.0279	18
2000	0.0342	0.0439				0.0277		0.0353	13
2001	0.0260	0.0324	0.0455		0.0364	0.0514		0.0384	11
2002	0.0371	0.0602	0.0693		0.0506	0.0657		0.0566	2
2003	0.0192	0.0187	0.0412		0.0329	0.0744		0.0373	12
2004	0.0308	0.0245	0.0190		0.0319	0.0676		0.0348	15
2005	0.0164	0.0163	0.0185		0.0397	0.0840		0.0350	14
2006	0.0225	0.0278	0.0328	0.0392	0.0190	0.1680	0.0324	0.0488	7
2007	0.0323	0.0342	0.0276	0.0458	0.0510	0.1549	0.0439	0.0557	3
2008	0.0262	0.0332	0.0267	0.0619	0.0545	0.1172	0.0413	0.0516	6
2009	0.0427	0.0224	0.0246	0.0499	0.0333	0.1661	0.0448	0.0548	4
2010	0.0245	0.0200	0.0172	0.0712	0.0236	0.1095	0.0364	0.0432	10
2011	0.0211	0.0158	0.0407	0.0539	0.0219	0.1202	0.0302	0.0434	9
2012	0.0189	0.0150	0.0248	0.0371	0.0210	0.0760	0.0269	0.0314	17
2013	0.0175	0.0180	0.1682	0.0237	0.0204	0.0675	0.0641	0.0542	5
2014	0.0305	0.0239	0.1388	0.0371	0.0305	0.1385	0.0503	0.0642	1
2015	0.0105	0.0194	0.0438	0.0136	0.0170	0.0947	0.0285	0.0325	16
Grand Total	**0.0559**	**0.0621**	**0.1210**	**0.0663**	**0.0491**	**0.2809**	**0.0532**	**0.0984**	
Ranking	5	4	2	3	7	1	6		

Table V: Average Discount for All Seven Investment Companies All Years

Table V shows the average discount for all Swedish investment companies all years. The data used is daily collected and the discounts are calculated with Share prices and NAV. The time-period is Jan 1997 to Feb 2015. The differences in number of observations are because of all firms have not been listed on the stock exchange for the whole period. Source: Nordea Markets Division Equities investment company data

Year	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Average	0.2064	0.2418	0.3543	0.3673	0.2463	0.2377	0.2473	0.1914	0.1142
Ranking	7	5	2	1	4	6	3	8	14

2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
0.071	0.1132	0.1819	0.1426	0.1316	0.1244	0.1452	0.0875	0.0735	0.0892
19	15	9	11	12	13	10	17	18	16

Table VI: Descriptive Statistics Forward-PE, Repo Rate and CBOE VIX

Table VI shows descriptive statistics for Forward-PE, Repo rate and CBOE VIX. The data is monthly data between Oct 2006 and Feb 2015. Number of observations are 102 for all companies. Sources: Factset (Forward-PE), The Riksbank (repo rate), Chicago Board Options Exchange (CBOE VIX).

	Forward-PE	**Repo rate**	**CBOEVIX**
Statistics			
mean	13.8372	0.0167	21.4378
N	102	102	102
max	18.8653	0.0475	59.8900
min	9.0499	-0.0010	10.4200
range	9.8154	0.0485	49.4700
sd	2.2053	0.0136	9.4448

Table VII: Regression Test Forward-PE and Discounts with Check for Extreme Values

Table VII shows the regression results for regression for level of discounts at month end and Forward-PE, when the observations of Forward-PE>17 are excluded. 6 observations are excluded compared to original regression in 6.5.1 and Table 4. Sources: Nordea Markets (discounts), Factset (Forward-PE).

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
ForwardPE	-0.0179***	-0.0163***	-0.00312	-0.0113***	-0.0469***	-0.0181***	-0.0115***	-0.0278***	-0.00664*
	(-11.79)	(-8.72)	(-1.66)	(-5.17)	(-6.68)	(-6.62)	(-4.11)	(-3.47)	(-2.53)
_cons	0.364***	0.405***	0.258***	0.440***	0.883***	0.411***	0.354***	0.113	0.0866*
	(18.80)	(17.37)	(10.34)	(14.13)	(10.30)	(10.90)	(9.17)	(1.00)	(2.54)
N	96	96	96	96	96	96	96	96	96
R^2	0.601	0.493	0.031	0.292	0.376	0.298	0.228	0.097	0.066

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table VIII: Regression Test CBOE VIX and Discounts with Check for Extreme Values

Table VIII shows the regression results for regression for level of discounts at month end and CBOE VIX, when the observations of CBOE VIX>30 are excluded. 13 observations are excluded compared to original regression in 6.5.3 and Table 6. Sources: Nordea Markets (discounts), Chicago Board Options Exchange (CBOE VIX).

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
CBOEVIX	0.00582***	0.00655***	0.00341***	0.00411***	0.0169***	0.00549***	0.00439***	0.00146	0.00496***
	(7.62)	(9.24)	(4.82)	(5.31)	(6.93)	(4.76)	(5.68)	(0.41)	(4.25)
_cons	0.00612	0.0598***	0.153***	0.209***	-0.0803	0.0568**	0.114***	-0.316***	-0.0939***
	(0.44)	(4.27)	(12.08)	(13.49)	(-1.45)	(2.77)	(7.96)	(-4.89)	(-4.11)
N	89	89	89	89	89	89	89	89	89
R^2	0.448	0.471	0.245	0.229	0.293	0.215	0.246	0.002	0.196

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table IX: Regression Test Forward-PE and Discounts Before 2011

Table IX shows the regression results for regression for level of discounts at month end and Forward-PE, for the period September 2006 to December 2010. All observations are included. Sources: Nordea Markets (discounts), Factset (Forward-PE).

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
ForwardPE	-0.0101***	-0.00417*	-0.000462	-0.00424*	-0.00843***	-0.00927*	-0.00516	-0.0455***	0.00256
	(-4.56)	(-2.29)	(-0.25)	(-2.36)	(-3.56)	(-2.25)	(-1.52)	(-6.57)	(1.01)
_cons	0.276***	0.256***	0.233***	0.334***	0.422***	0.294***	0.280***	0.393***	-0.0256
	(9.66)	(11.07)	(9.00)	(12.93)	(13.37)	(5.12)	(5.76)	(4.02)	(-0.76)
N	52	52	52	52	52	52	52	52	52
R^2	0.318	0.077	0.001	0.084	0.192	0.094	0.056	0.328	0.017

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table X: Regression Test Forward-PE and Discounts After 2011

Table X shows the regression results for regression for level of discounts at month end and Forward-PE, for the period January 2011 to February 2015. All observations are included. Sources: Nordea Markets (discounts), Factset (Forward-PE)

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
ForwardPE	-0.0185***	-0.0260***	-0.00442	-0.0211***	-0.0872***	-0.0180***	-0.0127***	0.0271*	-0.0129**
	(-10.27)	(-13.80)	(-1.94)	(-11.41)	(-8.68)	(-6.97)	(-4.77)	(2.50)	(-3.35)
_cons	0.361***	0.533***	0.266***	0.588***	1.395***	0.416***	0.365***	-0.670***	0.166**
	(15.21)	(20.30)	(8.69)	(23.15)	(10.71)	(11.59)	(9.72)	(-4.37)	(3.19)
N	50	50	50	50	50	50	50	50	50
R^2	0.685	0.863	0.085	0.773	0.676	0.450	0.387	0.144	0.175

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table XI: Regression Test CBOE VIX and Discounts Before 2011

Table XI shows the regression results for regression for level of discounts at month end and CBOE VIX, for the period September 2006 to December 2010. All observations are included. Sources: Nordea Markets (discounts), Chicago Board Options Exchange (CBOE VIX).

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
CBOEVIX	0.00282***	0.00181***	0.0000371	0.000956	0.00288***	0.00384***	0.00216**	0.00890***	0.000991
	(7.30)	(3.98)	(0.06)	(1.63)	(4.43)	(4.47)	(2.85)	(5.60)	(1.25)
_cons	0.0654***	0.153***	0.226***	0.251***	0.233***	0.0687**	0.155***	-0.460***	-0.0151
	(5.58)	(11.97)	(14.54)	(15.94)	(13.68)	(3.18)	(8.52)	(-8.40)	(-0.71)
N	52	52	52	52	52	52	52	52	52
R^2	0.447	0.259	0.000	0.077	0.401	0.289	0.177	0.225	0.046

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table XII: Regression Test CBOE VIX and Discounts After 2011

Table XII shows the regression results for regression for level of discounts at month end and CBOE VIX, for the period January 2011 to February 2015. All observations are included. Sources: Nordea Markets (discounts), Chicago Board Options Exchange (CBOE VIX).

	(1) EWP Discount	(2) EWP-R Discount	(3) Industri Discount	(4) Investor Discount	(5) Kinnevi Discount	(6) Latour Discount	(7) Lundberg Discount	(8) Ratos Discount	(9) Melker Discount
CBOEVIX	0.00419***	0.00487***	0.000450	0.00393***	0.0168***	0.00546***	0.00184*	0.000114	0.000673
	(5.64)	(3.97)	(0.89)	(3.56)	(3.91)	(6.03)	(2.21)	(0.03)	(0.63)
_cons	0.0320*	0.0869***	0.197***	0.227***	-0.108	0.0719***	0.158***	-0.298***	-0.0237
	(2.21)	(3.88)	(19.65)	(11.29)	(-1.31)	(4.23)	(10.31)	(-4.34)	(-1.03)
N	50	50	50	50	50	50	50	50	50
R^2	0.360	0.308	0.009	0.272	0.258	0.426	0.083	0.000	0.005

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Diagram I - VI: Scatter Plots Original Regressions

Scatter plots over the original regressions presented in section 6.5.1 – 6.5.3. All observations, 102, are plotted. Sources: Nordea Markets (discounts), Factset (Forward-PE), The Riksbank (repo rate), Chicago Board Options Exchange (CBOE VIX).

Diagram I: Forward-PE and EWP

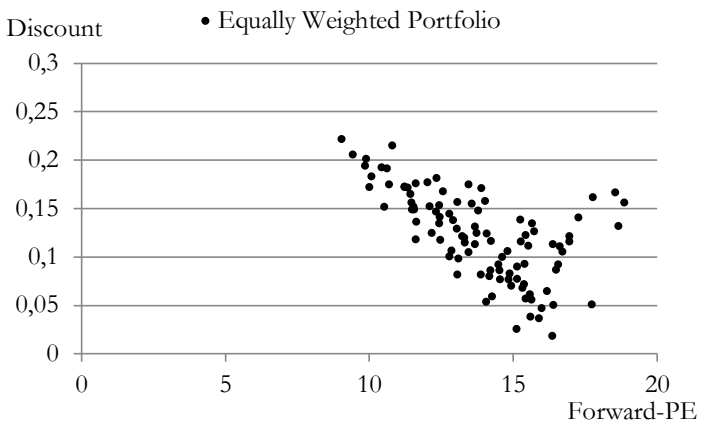


Diagram II: Forward-PE and EWP-R

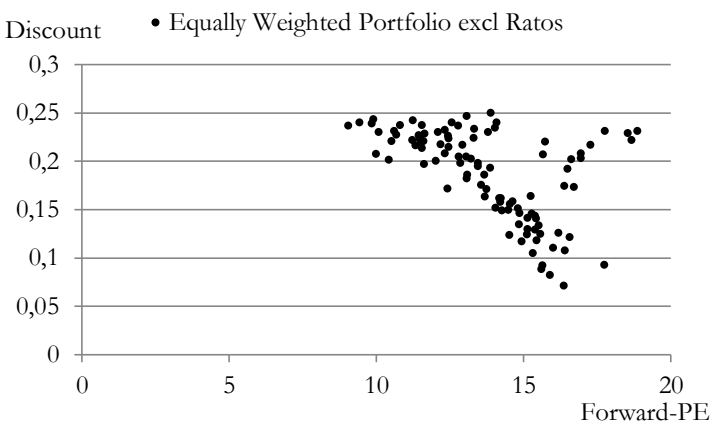


Diagram III: Repo rate and EWP

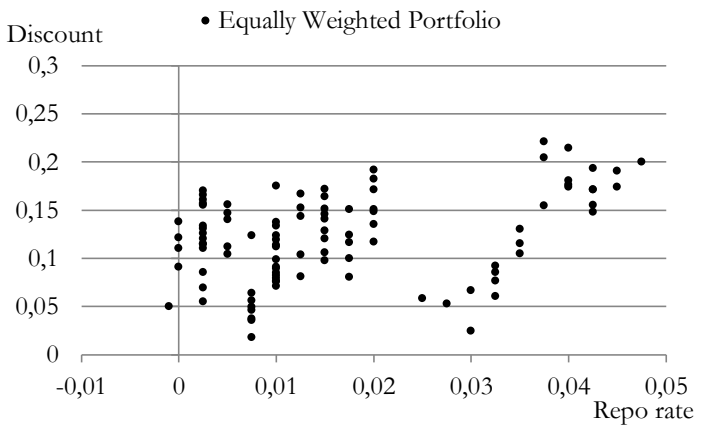


Diagram IV: Repo rate and EWP-R

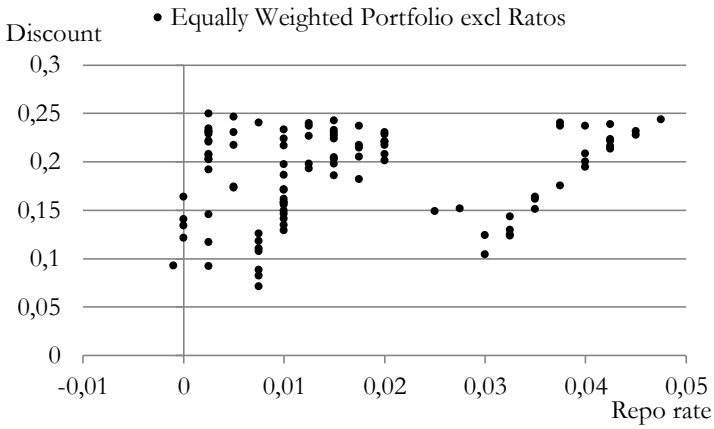


Diagram V: CBOE VIX and EWP

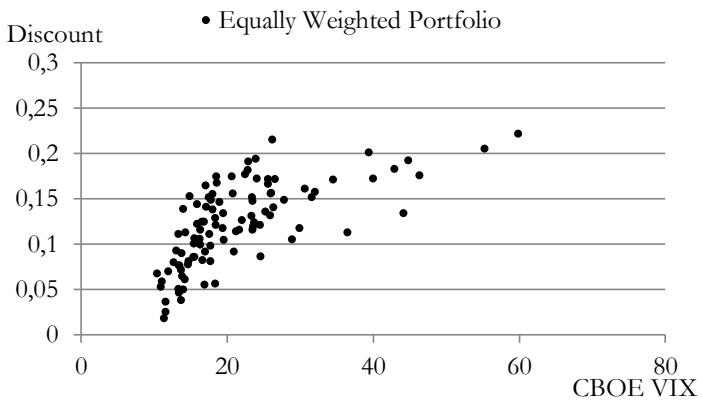


Diagram VI: CBOE VIX and EWP-R