The Discount Delusion

The Swedish Closed-End Fund Premium Puzzle

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Abstract

The final piece to the Closed-End Fund Puzzle has long eluded researchers and practitioners alike. Many attempts have been made in order to explain the existence of persistent discounts on their net asset values with varying results that sometimes outright contradict each other. We contribute to the discourse of discounts by using a unique dataset consisting of daily observations of 11 Swedish CEF discounts from January 2000- December 2012 that has been continually been constructed by professionals. We believe that the quality of the data is optimal for a study trying to establish a connection between continuous variables studied in the paper and a big improvement over the often quarterly data that researchers have used in the past. In addition, we study fund managements' ability to generate abnormal returns, and test whether current levels of discounts have predictive power over future performance and costs using both tried methods as well as new and refined ones. Our results indicate that high dividend yields, managerial ability and the ratio of illiquid assets reduce discounts. Surprisingly, high management fees only showed small positive effects on the level of discount. Finally, we find that discounts are negatively correlated with future abnormal returns. Those who buy high discount CEFs thinking that they are bargains will have the numbers against them; the apparent undervaluation of the assets is only a delusion.

Keywords: Closed-End Funds, Discounts, Persistence, Sweden, Efficient Market Hypothesis

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Foreword

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Terms and abbreviations

Discounts = The difference of the market value of the fund's assets and the price the market pays for the fund's shares. The term premium is used for negative discounts.

$$\boldsymbol{Discount} = NAV - Market\,Value$$

CEFs= Closed End Funds

CEFs are equivalent to investment companies

OEFs= Open End Funds

NAV= Net Asset Value

MF= Mutual Funds

1. Introduction

The Closed- End Fund discounts have long been an unsolved puzzle for investors, practitioners and journalists alike. Despite extensive research, researchers have not been able to fully explain the discounts while individual investors tend to overlook factors that should affect the discounts. Many explanations have been proposed and studies have been made with various results.

CEFs were introduced over a century ago in the United States (Baird's Private Wealth Management Research, 2011). Advantages of investing in CEFs include, but are not limited to, access to illiquid markets and professional management that actively manages the investment portfolio. One of the most famous characteristics of CEFs is that they can be traded at either premiums or discounts (Baird's Private Wealth Management Research, 2011) relative their Net Asset Value. Over 1965-1985 the average discount on major closed end funds in the United States was 10.1 % (Lee, Shleifer and Thaler, 1990). The law of one price and consequently no arbitrage are features of an efficient market. Arbitrage opportunities in equities traded in different stock exchanges for example are quickly exploited by market actors specializing in identifying them. Conventional finance theory states that market efficiency is achieved when funds are being priced at the total value of their underlying assets minus debts, the NAV.

In the case of Open Ended Funds, the price and the NAV will always be the same when the fund is settled at the end of a trading day. When an investor purchases a share the fund will automatically use the capital infusion to acquire the underlying assets on the market. When the investor sells shares of the fund, the assets are liquidated and distributed back to the investor. This mechanism is the namesake of OEFs and the reason they are always priced at the value of the underlying assets. CEFs often exhibit what could be perceived as anomalies where they are traded at either a premium or a discount relative their NAV. The big difference between OEFs and CEFs is that the former has a dynamic structure while the latter raises money once through an IPO before becoming available for trading on a stock exchange with a finite amount of shares, allowing the price to diverge from the net worth of their investment portfolio. The apparent discrepancy in the pricing of the assets of CEFs has not gone unnoticed by practitioners or researchers and much effort over the past

decades has been put into trying to explain the phenomenon. Investors looking to benefit from what they perceive as obvious arbitrage have most likely walked away disappointed as discounts have tended to persist over time. As for academia, many factors have been studied but the results have varied, with some results outright contradicting each other.

Early research built upon classical finance where various performance measures were studied. Even though there has been empirical support for some of these theories, there have been no models able to fully explain the CEF pricing puzzle. Instead, the phenomenon has become somewhat of an icon for behavioral finance that suggests that exhibited discounts are signs of the market's irrationality. Indeed, studies with investor sentiment, noise trading and costly arbitrage as the focal points gained ground at the expense of classical performance measures. Lately however studies have started to find stronger support for the rational theories.

1.1 What are CEFs and why invest in them?

CEFs are financial intermediaries that manage portfolios of assets usually consisting of equities and/or bonds. They are much fewer in number than their open ended cousins but possess characteristics that make them attractive in their own right. Investors can invest either directly, through the financial markets, or indirectly, through financial intermediaries. CEFs, as all other funds, are only available as a direct investment. There are many reasons for investing through intermediaries, but the biggest draw in most cases is access to experienced professional management. Individual investors often do not have the time, knowledge or resources to analyze and invest in a larger set of securities. Classical finance even goes as far as stating that investors are best off by only investing in index funds as to diversify away idiosyncratic risks instead of actively managing one's assets. Against this background, the idea of enjoying higher than market returns suddenly becomes rather enticing. One option is to invest in CEFs with access to experienced managers. Looking back for the Swedish sample, this would have been quite a good idea.

Figure 1

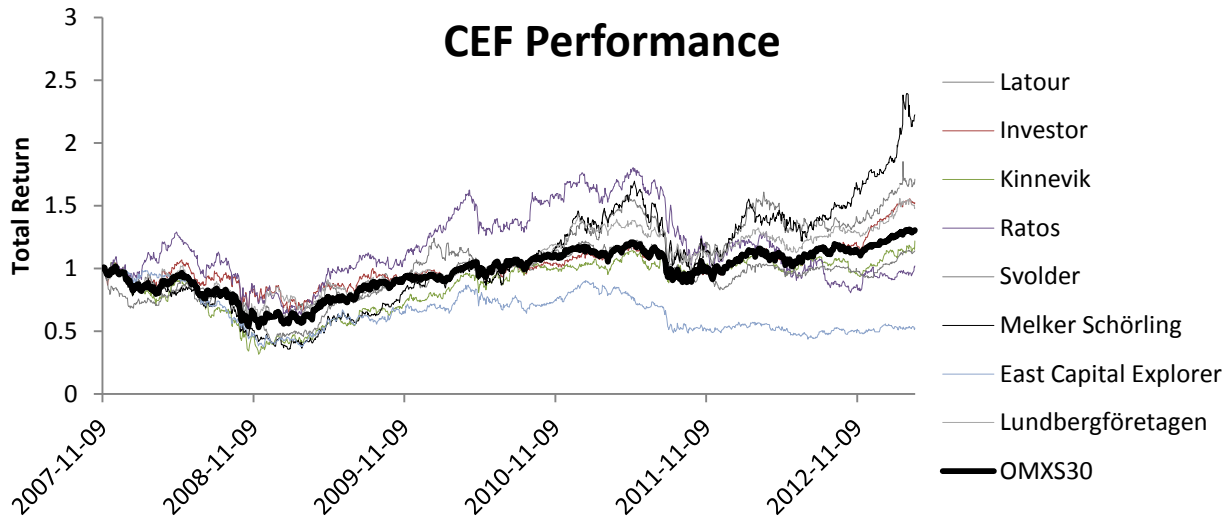
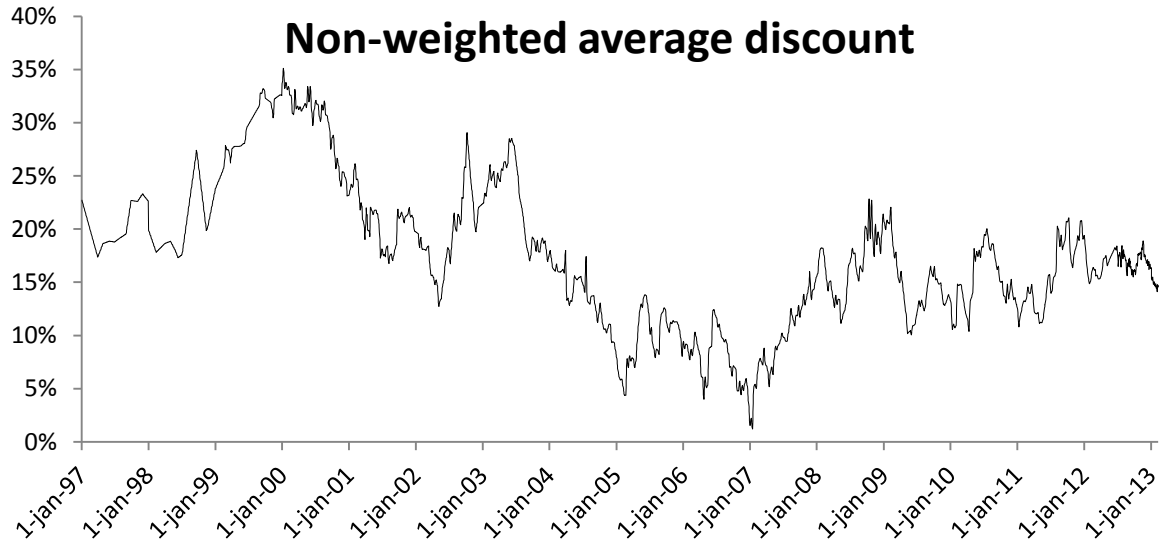


Figure 1 shows the total return indices for the largest CEFs on the Stockholm Stock Exchange rebased to the earliest date for which the whole shown sample are listed. The thick black line represents the OMXS30 index total returns. A quick look reveals that many of the funds have beaten the index which implies that there indeed are abnormal returns to be enjoyed by investing in CEFs. Worth noting is that the choice of date for rebasing the total returns matters, since choosing another date leads to different relative returns. The data sample we have on CEFs shows they have averaged a higher return than the market. CEFs also offer opportunities to diversify one's holdings. Buying shares in a CEF provides investors with a pre-defined, actively or passively, managed portfolio which can complement their main holdings.

Access to otherwise closed markets is also something that may attract investors to CEFs. A number of the Swedish funds allocate capital to unlisted and therefore illiquid firms. One clear advantage is that there are more market inefficiencies to exploit on illiquid assets. Investors not being able to access these markets due to the sheer sizes of the transactions and/or transaction costs may therefore consider investing in CEFs instead.

Figure 2



A seemingly apparent advantage that OEFs have against CEFs is the fact that they always trade at their NAVs due to the underlying assets being liquidated the moment investors sell his/her shares, allowing the fund to distribute them minus some transaction fee. The average discounts of the largest Swedish CEFs on the other hand have historically been at around 15-25% as seen above. For better or worse, both media as well as some professional analysts have put forth the discount case as legit investment opportunities. For investors willing to play the discount game, CEFs provide ample opportunities to speculate on. However, investors choosing to buy CEFs with high discounts are often disappointed given the persistence of discounts over time.

1.2 Purpose

The purpose of the paper is two-fold. First, we aim to provide a qualitative overview of previous literature on the subject, along with a brief overview of the Swedish investment company landscape and its background. Doing so will introduce the reader the main theories for CEF discounts from both the behavioral and rational branches of research. It will also introduce the reader to Swedish CEFs/Investment companies. The Swedish sample is interesting to look at since it has not been studied to the same degree as the American and the English ones. The origins of a number of the Swedish investment companies are also of interest with many of them belonging to influential families which set them apart from many other CEFs.

The second and main goal of the paper is to attempt to empirically link relevant factors to exhibited levels of discounts. We believe this is important due to several reasons. Media and equity analysts alike seem to be overlooking factors that may very well affect the discounts. Swedish financial media outlets often comment on the discounts when they reach either high or low levels but never delve deeper into the root causes for their existence. Many articles are short and vaguely point at "the market's trust in the fund's management" as the main factor. While this is not false in a strict sense, failing to elaborate upon what criteria the market is judging CEF performance on means that the reader has to find a way to do so themselves. Analysts that cover Swedish CEFs often fail to rigorously analyze discounts and are often content with pointing at historical averages. A direct consequence of media and analysts failing to address the discounts properly may be that the unsophisticated investors will not be able to assess the funds' worth correctly, leading to those that have an information advantage having an edge. In addition to our main goal we will also test whether CEFs generate risk adjusted abnormal returns. This is of interest as it will show if investors should consider investing in CEFs at all.

We believe the issue of CEF discounts is especially important from the perspective of small and private investors. Even though most of the CEF shares are held by institutional actors and influential business families in Sweden, they are also very popular amongst private investors in the country. Small investors often consider buying shares of investment companies as a good way of getting exposure to different companies and industries without having to commit large amounts of funds. While

small investors' total ownerships of the funds are small, they are important to consider as they are at a potential disadvantage as minority shareholders.

Since many small investors only read about the discounts in media we also suspect that they do not fully understand CEFs and how they work, which puts them in an even worse position. Discussing CEF investments with peers has for example almost always been focused on discounts without actually reflecting around what might cause them. When choosing what branch of explanations to research, it boils down to whether one believes that the market is rational or not. Even though the behavioral theories have their points, it is our belief that a solid theoretical framework where actors act rationally makes for a much more convincing foundation when trying to explain the discount phenomenon. Market transparency and the ease of information diffusion has come a long way since the early CEF discount studies due to progressing information technology; easier access to information may lead to more rational behavior.

The paper will contribute to the discourse by using a unique dataset constructed by professionals with more frequent observations than past papers. Previous studies identified have mostly used quarterly data and in the best cases weekly. In addition to a refined sample, we also present a brief overview of the Swedish investment company landscape and its history, providing a solid context to our studied objects and sample.

1.3 Research Questions

Our primary research question we address in our empirical tests is how management fees, managerial abilities, the NAV dividend yield and the illiquidity ratio affect the CEF discounts. We will also employ a number of controls and alternate test specifications to check for the robustness of our results. A direct consequence of our study is that in addition to our main research question, we will study the time variability of the fund management teams' ability to generate abnormal returns. Finally, in order to test the rational assumptions of the market, we will also run tests to see whether current levels of discounts contain information about future performance and costs.

Outline

In section 2, Qualitative Description, we go through the Swedish CEF context and why it is an interesting sample to look at.

In section 3, Literature Review, we list the main branches of research and describe previous studies and their results.

In section 4, Theoretical Framework, we present and argue for the theory of our study.

In section 5, Hypotheses, we present a list of the hypothesis that we want to test based on theory.

In section 6, Data, we describe how we collected our data, the dimensions of the data, and identify potential problems with the data set.

In section 7, Method, we specify the exact methods for we plan to use to test our hypotheses.

In section 8, Descriptive Statistics, we exhibit and comment on the descriptive attributes of our main variables from inferential statistics.

In section 9, Results, we present and analyze the results of our tests.

In section 10, Conclusions, we summarize our findings and discuss their implications.

In section 11, Further Research, we suggest research areas where we believe there is room for improvement.

2. Qualitative Description - Closed End Funds in a Swedish Context

The Swedish CEF market is distinctly different to the US and UK CEF markets. US CEFs are mainly retail products sold to private investors, while in the UK CEFs are largely owned by institutional actors. While Swedish ownership is leans towards the institutional context as well, it differs from both above markets in the sense that the main funds are controlled by powerful banking families and/or by industrious entrepreneurs that have built up conglomerates. The Swedish CEF market also differs in terms of tax legislation. While American CEFs are affected by tax liabilities, Swedish CEFs do not pay taxes on realized gains since the system emphasizes tax neutrality for the investor[1].

2.1 History of Swedish Investment Companies

During the early years of the modernization of the Swedish economy, it was difficult for companies to find capital for new investments. At this time the stock market was insufficient and industrial companies primarily financed investments with operational cash flows or from bank loans. As a consequence of the 1911 Banking Act, the number of companies that obtained bank financing increased substantially but the stock market was still insufficient. The Swedish entrepreneur Ivar Kreuger built up a conglomerate of companies during the 1920s. After Kruger committed suicide it became clear that Kruger's companies had manipulated the books. Swedish commercial banks were heavily invested in Kreuger's companies. As a consequence of the bank's investments, they became owners of a large number of stocks in the Kreuger companies (Wetterberg, 2009). Kreuger's lawyer Hugo Stenbeck gained a large ownership position in a number of companies at this time as well. This was the beginning of the Stenbeck family owned investment company Kinnevik.

In 1933, regulations were initiated stating that banks were only allowed to own stocks in companies to protect assets that were distressed. The banks were forced to sell their holdings in companies they had collected as collateral following the Kreuger crisis. Swedish companies were undervalued on the stock markets at this point of time. To avoid selling its assets at discount, the banks moved their assets to holding companies. Skandiabanken founded the holding company Custos in 1937 and Handelsbanken established Industrivärden in 1944 (Wetterberg, 2009). SEB had

[1] See Appendix C for Swedish CEF Tax Rules

already founded Investor in 1916. CEFs now owned stocks that had been acquired by the banks as collateral during the Kreuger crisis (Wetterberg, 2009). The bank controlled CEFs that were founded following the early crisis are today the largest CEFs on the Swedish market, and these CEFs are still heavily controlled by the powerful families.

Other family controlled CEFs have been started by entrepreneurs. Lundbergs was founded in 1944 by the entrepreneur Lars Erik Lundberg. The company has been listed on the Stockholm Stock Exchange since 1983, and the Lundberg family has kept a clear majority holding of the company. Melker Schörling AB is another family controlled CEF that was founded in 1999, with roots going back to the company Securitas which the entrepreneur Melker Schörling founded in 1987. While a large fraction of the US sample CEFs are funds sold as retail products, above mentioned CEFs showcase characteristics of conglomerates.

3. Literature Review

Extensive research into the CEF universe has been conducted, and researchers have generally fallen into one of two camps: rational or irrational. The rational branch of theories builds upon traditional financial research and was first to be explored chronologically. On the other hand, irrational theories are related to behavioral economics/behavioral finance which are areas that have received widespread attention the past couple of decades. Attempts to explain the discount within the rational context have been made with studies of performance related measures such as management fees, tax effects, dividend yields and managerial ability as well as the effects of illiquidity. The behavioral family of explanations includes costly arbitrage, diversification, investor sentiment and the existence of noise traders. Most previous research has been performed on the American and UK markets. Hjelström (2007) is one of the few researchers who has tested CEFs in a Swedish context. See table below for a selection of topics that have been covered in previous research.

Rational Explanations	Behavioral Explanations
Management Fees	Costly Arbitrage
Tax Effects	Diversification
Dividend Yield	Investor Sentiment
Managerial Abilities	Noise Trading
Illiquidity	Excess Volatility of Fund Share Prices

3.1 Rational Explanations

The rational explanations rely on the assumption that the market is efficient, or at least close to it. The market adjusts the NAV for costs and any arbitrage opportunities that arise due to market inefficiencies are corrected by those who are able to. In essence, the rational explanations deal with how the funds are valued on a fundamental level. The NAV reflects the worth of a fund's net assets but do not take into account additional effects on cash flow to investors originating from the funds' operations, implying that those who only look at the reported NAVs are mistaken in their beliefs that NAVs reflect the true values of CEFs. Instead, if conventional valuation wisdom applies, exhibited discounts or premiums are not anomalies but required features of an efficient market. In the following section, we list and describe

the main explanations of discounts that have been identified and classified as being in line with classical finance.

3.1.1 Agency Costs

Potential agency costs arise when a principal hires an agent to act on his/her behalf. For CEFs, the principals are the shareholders and agents are the management. Agency costs related to CEFs include management fees, dividend yield and distribution policies, managerial ability and management ownership. CEF discounts result from high management fees, uncertainty regarding the managers' fund managing abilities and agency problems related to diverging interests of the principal and its agents.

3.1.1.2 Management Fees

Malkiel (1977) attempts to establish a relationship between the CEF discount and management costs. The variable used in the tests is the relative size of the current costs of the fund to the NAV of the fund. His results, and the results of a previous paper on the same topic by Boudreaux (1973), were insignificant. More research followed with mixed results, leading to the conclusion that management fees had no effects on the discounts of CEFs. The topic lay dormant for some time until Kumar & Noronha (1992), Baur, Coelho & Santoni (1996) and Ross (2002) revisited the area with studies whose outcomes were significant in favor of the rational framework that had been built a couple of decades earlier. Ross (2002) contributed to literature by introducing a new measure combined measure of management fees and the dividend yield. In a simplified world where the only streams of cash flows that matter are the dividends and management fees, Ross construct a ratio that in theory should predict the level discount by dividing the fund's expected cost ratio going forward divided with itself plus the dividend yield[2]. Given that the management fees and dividends equal the total cash flows of a CEF, the ratio represents the percentage of the total cash flows a CEF generates that are not claimed by investors. As the NAV is the aggregated valuation of the underlying assets' cash flows, this means that the expense ratio should equal exhibited levels of discounts.

Kumar & Noronha (1992) also looked at management fees as an explanatory variable for exhibited levels of CEF discounts. Instead of using the same variable that Malkiel

[2] $Expense\ Ratio = \frac{Fund\ Cost\ Ratio}{Fund\ Cost\ Ratio + Dividend\ Yield}$

had used in his early research, they opt for a Present Value[3] based variable that discounts all future outflows of cash attributed to costs. There are two main reasons for this. First, using the current levels of costs relative to the NAV is inconsistent since it ignores all future costs. Second, it could induce a multicollinearity problem due to the definition of the NAV. If costs are assumed to be discounted expected cash flows, the costs should already be incorporated in the NAV. Having costs on both sides of a regression could therefore be problematic. In line with the predictions of Kumar & Noronha (1992), using a PV version of the management costs variable shows a significant negative (positive) relationship between the premium (discount) and itself.

Baur, Coelho & Santori (1996) develop the concept further and discuss theories regarding the relative costs of managing one's own assets versus outsourcing it. In the first case, the net wealth of the investor would be the worth of the assets, or NAV, minus the PV of the management costs that the investors incur if they manage the portfolio privately. The authors argue that these costs would in some cases be higher than that of the specialized knowledge that exists in professional fund environments. Investors with higher internal management cost PV will invest in financial intermediaries such as CEFs, while those with lower costs will manage assets on an independent basis or maybe even start a fund of their own. People will keep on buying the fund until an equilibrium state is reached, where internal management costs equal the management fees of the funds. This results in a difference in value of stock compared to the NAV that is expressed as a discount.

Figure 3

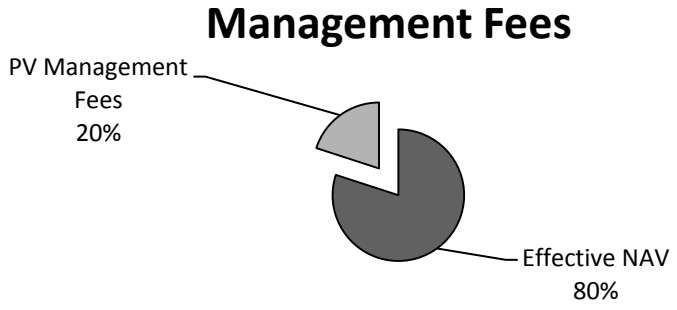


Figure 3 illustrates the main point of research focused on CEF management fees. Since management fees represent outflows of cash that do not go to the investors, the

[3] [3] Henceforth referred to as PV

PV of the fees should be deducted from the NAV value in order to better reflect the effective NAV that belongs to shareholders. This is supported in previous studies where the NAV and the market price of the shares converge on announcements of open ending CEFs (Brauer, 1984). If everything else is held constant, this implies that the management team comes pre-packaged with the fund. As noted, the fundamental difference between a CEF and an OEF is the latter's ability to issue new shares and redeem/liquidate existing ones by demand as opposed to having to buy and sell them on a stock exchange. In the first case, management is temporarily "hired" by the investor and "fired" when the fund shares are redeemed. For CEFs however management stays and since they are assumed to stay with the fund indefinitely, their fees should be deducted from the NAV when shares are being traded on the stock market (Baur, et al., 1996). An issue when discounting management fees is to choose the right discount rate. Taking into account the long-term nature of the management team's contracts, expenses tied to them could be viewed as an almost fixed perpetuity which arguably should be discounted with the risk free rate of return.

3.1.1.3 Dividend Yield and Distribution Policy

Malkiel (1977) proposes that there are two distinct effects of the distribution policy on the CEF discounts. A fund that realizes and distributes capital gains will have little, if any, unrealized gains. As we will discuss below, part of accumulated capital gains are taxes which should not really count towards the NAV. Second, "capital-gains dividends" are a form of liquidation of the fund. By liquidating, NAV for that particular fraction will be realized and the investors will benefit from the discount immediately. Dividends are in essence net redemptions initiated from the fund's side that are distributed to the shareholders. Malkiel (1977) finds that high dividend yields do correlate negatively with discount, confirming this line of reasoning.

3.1.1.4 Managerial Ability

One of the main reasons for investing in CEFs is to enjoy excess returns from the managerial skills of the fund managers. If managers are expected to generate persistent net excess returns relative comparable indices, the fund should trade at a premium. The opposite will generate a discount to match investors' required rates of return. The big question is then whether fund performance is persistent over time or not. Brown et al. (1992) speculated that observed performance persistence in Mutual Funds Perfomance was the result of survivorship bias - funds that do badly die and disappear from the sample, leaving only those that perform well. However, later

research by Brown & Goetzmann (1995), and Carhart (1997) on samples free of survivorship bias confirms persistence of performance over time. With persistent cross-sectional performance differences across funds, it could be argued that the market should price them accordingly. However, this is not possible with OEFs since they are always traded at their NAVs, denying the market the possibility of penalizing the fund with lower prices should it expect sub-par performane. From this perspective, the CEFs are a perfect sample amongst funds to research the market's valuation of expected performance. Due to their closed ended structures, they have a finite amount of shares that are traded in the stock market. A direct consequence is that they, unlike OEFs, can be priced at levels that differ from their NAVs. Bodreaux (1973) and Malkiel (1977) explore the concept of the market pricing the funds according to their expected performances. Market actors acquire information on funds through official channels and form their expectations of future performance with them as the base.

Hendriks, Patel, Zeckhauser (1993) also find that the managers of some firms always have up to date information, or "Hot Hands", that lead to persistence in performance. Consequently, in a CEF context funds with superior expected performance relative relevant benchmarks should be awarded premiums while subpar funds in the eye of the market should be priced at discounts lest they become either under- or over-valued assets. For example, should all investors have a discount rate of 10% and a fund is expected to return 8%, the market will clear when the CEF is priced at a 20% discount. When Malkiel (1977) study the relationship between performance and discounts he uses the total rate of return (including dividends and capital gains measured over a number of different time periods), and a risk adjusted measure obtained by regressing the funds' quarterly returns onto a market excess return variable based on the S&P 500. He notes that in order for the regression to make economic sense, one would need to use the NAV for the funds' performances. Investors ultimately care about the market prices of the funds' shares. Shares include the discounts, which is the variable that is to be explained. Therefore, in order for the managers' abilities to be measured correctly, the NAV should be used. When running the actual tests the performance coefficients were insignificant.

The results of other earlier studies with the same line of reasoning were mixed and it was concluded that there were no significant effects of past performance on the CEF

discounts. Lee, Shleifer & Thaler (1991) point out that a more appropriate test in a rational setting would be to skip current and past performance in favor of relating discounts to future NAV developments. When testing for it the results were significant albeit with the opposite sign from what was expected, indicating a positive relationship between the magnitude of discounts and future NAV performance. Pontiff (1996) tested the same hypothesis with insignificant results. Later, Chay & Trzcinka (1999) were the first to find a significant positive relationship between the level of discount and future NAV performance on a 1-year basis, with somewhat weaker results when looking at 2-year lags and upwards. To add robustness to their results, they measured managerial abilities in five distinct ways. Their variables for proxying managerial abilitiy include both non-risk adjusted returns as well as risk-adjusted ones according to the CAPM, the CCAPM, a five-factor APT index and Carhart's four-factor model which basically is the Fama-French 3-factor model with the addition of momentum factor. By regressing the funds' returns on the relevant factors, significant negative correlation between abnormal returns and the level of discount were found.

3.1.1.5 Management Ownership

A CEF agency problem that may arise is related to the level of managerial fund ownership. One apparent way to get rid of discounts is to either liquidate or open-end the fund**.** Doing any of the two however absolves the current form contract between a fund and its management with them losing their jobs as a likely consequence. Managers are therefore against open-ending as an option to get rid of the discounts. The situation would be slightly different if managers own a relatively large fraction of the fund. Given that they would enjoy the disappearance of the discount as anyone else, there should be an ownership level where they too would find it beneficial to open-end or liquidate. Testing this hypothesis empirically resulted in the opposite relationship being observed instead; high management ownership ratios are correlated with higher discounts on the cross sectional dimension (Barclay, et al., 1993)**.** In response, the study pitches an alternate explanation where block ownership introduces a clash of interests between large and small shareholders. Large shareholders are theorized to exercise strong enough influence of the funds that they may extract private benefits that do not accrue to small shareholders. Examples of private benefits that the authors bring up are monetary compensation to blockholders as employees of the fund, the blockholder owning a company that

receives fees for management or administration of the fund, benefits from voting rights associated with equity securities in the fund's portfolio and costly actions financed by the fund to resist an open-ending proposal.

3.1.2 Biases in the NAV

In addition to agency costs, the NAV may be both under- and overrated due to biases in reported values. As with agency costs, an efficient market assumes that the reporting bias is taken into regard when valuing the CEFs. The most prominent topics within this category are issues dealing with tax liabilities and liquidity. The results from previous studies have been mixed regarding how reporting bias affect discounts.

3.1.2.1 Tax Bias & Timing

Malkiel (1977) argues and tests for the tax effects of the holdings. Given that a fund has unrealized gains, investors face tax liabilities that are not directly reflected in the NAV of the fund. It is therefore reasonable to believe that investors should pay the NAV less the taxes on accumulated gains. Pratt (1966) on the other hand contends that there are no tax liabilities until gains are realized and that they are insignificant in terms of magnitude in the first place. This also gives rise to the discussion regarding holding times and realization timing. It was of Pratt's (1966) opinion that CEFs could time realizations with cold markets and distribute the proceeds, giving investors a higher stream of cash flow during bad times. The consequence could be that that there are some that seek out large unrealized gains. This effect should decrease the discount.

Figure 4

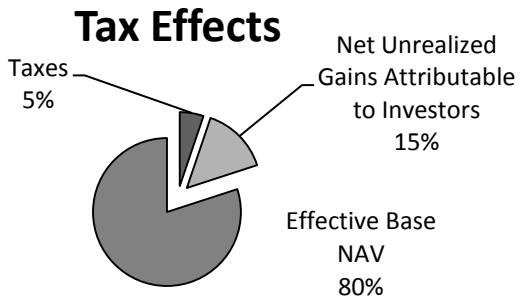


Figure 4 shows a simple example of the proposed tax effect. As taxes are not attributable to shareholders, one should also not pay for them. Malkiel (1977) calculates the PV of expected tax liabilities and finds significant links between the magnitudes of the liabilities. Malkiel (1977) also note the effect depends on the

holding period of the investors. While an important consideration for the American context, the tax perspective is not as relevant in Sweden since CEFs do not pay taxes on realized gains; current tax laws state a neutral relationship between holding assets directly and indirectly through an intermediary.

3.1.2.2 Illiquidity

The effects of CEFs holding illiquid assets have also been a topic of discussion. There are two different types of illiquidity associated with CEFs; (1) shares of the CEF and (2) underlying assets in the CEF's portfolio. Most previous research about illiquidity has focused on the level of liquidity of the underlying assets of the CEF's portfolios. Researchers have not been able to agree on the effects of liquidity of underlying assets and arguments for both negative and positive effects exist. Researchers argue that liquidity in underlying assets of CEFs can affect discounts in two different ways. On one hand, it could be attractive for an investor to get access to stocks that are not traded on open public stock exchanges. Hence, investors would be willing to pay a premium for accessing illiquid funds. On the other hand, investors may question the reported value of the illiquid assets since it is hard to determine a fair market price for the illiquid assets. If investors cannot feel confident with the values reported by managers, it would make economic sense with discounts for CEFs.

Malkiel (1977) stands for an early research about how liquidity affects discounts. By using a ratio of restricted stocks and total value of the portfolio, significant results were obtained showing that the ratio of restricted assets is positively correlated with discounts. Restricted stocks in the model are defined as stocks that must be held for a certain period of time. Seltzer (1989) builds upon earlier research about restricted stocks. However, where Malkiel (1977) only looks on restricted stocks, Seltzer (1989) adds that CEFs also hold other securities that are illiquid. These illiquid securities are difficult to price and tend to be overvalued (Seltzer, 1989). Hence, a reason for discounts in CEFs is due to mispricing of illiquid and restricted securities. Seltzer (1989) also states that there is a difference of liquidity between stocks on different stock exchanges. Trading volume of securities is used by Seltzer (1989) to proxy illiquidity. Lee, Shleifer and Thaler (1990) argue that Malkiel's restricted stocks model cannot fully explain discounts, as many of the CEFs with high discounts only hold liquid assets.

Cherkes, Sagi and Stanton (2009) develop a rational liquidity-based model. The authors argue that many CEFs specialize in securities that are illiquid, while the actual CEF is relatively liquid. It is favorable for investors to invest in illiquid assets through a CEF since it is less costly than investing in the illiquid assets directly. The authors find support for their hypothesis that investors pay a premium for illiquid assets. In other words, by increasing the level of illiquid assets in a CEF, fund managers can reduce discounts.

Figure 5

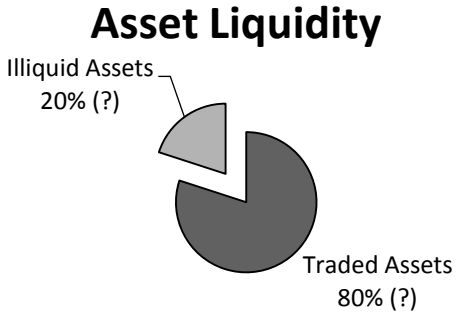


Figure 5 illustrates a valuation case where the traded equities account for 80% of the portfolio and the illiquid assets 20%. As the illiquid assets are not already priced by the market however investors cannot be sure of their value. A direct consequence could be that investors value these either higher or lower than reported numbers.

3.1.2.3 Capital Structure

Previous research shows that the capital structure of the CEF can impact the level of discount. A higher level of leverage leads to a higher returns and higher level of risk for the CEF. Therefore, leverage increases the NAV in rising markets, and decreases the NAV as markets fall (Cherkes, Sagi and Stanton, 2009). Researchers seem to agree that taking on leverage reduces discounts. Since institutions generally have lower financing costs compared to private investors, it is less costly for a CEFs to hold a leveraged portfolio than for an investor. Cherkes, Sagi and Stanton (2009) calculate quarterly leverage ratio from S&P Capital IQ. The authors find support for the assumption that CEF leverage offers a liquidity benefit. The leverage ratio of a CEF is negatively related to the discount which means that increasing leverage for a CEFs means lowering the discount (Cherkes, Sagi and Stanton, 2009). Elton et al. (2010) compares how the difference of leverage in OEFs and CEFs affect performance of the funds. The authors show that that leveraged funds perform better than unleveraged

funds. The CEFs ability to borrow short and lend long increases the returns. This also means that a CEF can take on leverage to reduce discounts (Elton et al., 2010).

3.1.3 Summary & Criticism Rational Theories

The rational branch of explanations implies that the reported NAVs of CEFs are in fact overstatements of how much they are actually worth. The market is not oblivious to this fact and adjusts its valuation of the CEFs accordingly. In this context, the occurrence of discounts has its roots in valuation issues. Above sections have gone through the considerations that rational research up until now has concentrated on. Aggregating the factors, the level of discount or premium depends on whether the theorized positive or negative effects dominate each other.

One of the main criticisms against the rational theories is that they have been unable to explain why CEFs are issued at near NAV levels only to fall into a level of discount shortly after. Another often brought up criticism which we have already touched upon is why discounts disappear when the fund is open-ended and/or liquidated. Selling at full price only to drop into discount is theorized to be because of changing perceptions regarding the management's skill (Berk & Richard, 2007) while the latter is explained by dissolving the management teams' long term contracts.

3.2 Irrational Explanations

The behavioral branch of explanations implies that the market is not fully rational since attempts to explain CEF discounts have failed in the past. Instead, the behavioral branch classifies discounts as anomalies. Topics that have been studied range from individual investors trading in unpredictable patterns to frictions that limit the opportunities to exploit arbitrage.

3.2.1 Investor Sentiment & Noise Traders

Lee, Shleifer and Thaler (1990) discuss how investor sentiments affect discounts. The authors introduce a model where investors are divided into rational and irrational investors. Irrational investors are also called noise investors. The rational investors behave according to the standard set of characteristics that financial theory denote them; they have unbiased expectations and are risk averse. Noise investors on the other hand make investment decisions based on irrational arguments and make systematic forecasting errors that change over time which induces the namesake noise in stock prices. Noise investors can be either overly optimistic or overly pessimistic about the future (Lee, Shleifer and Thaler , 1990).

In the eyes of the rational investors, this irrationality becomes a new and unpredictable source of risk that they must consider in addition to the standard fundamental and systematic risks. If the rational group knows for a fact that there exist active noise traders in the markets for CEFs, rational traders will not pay the full price of the portfolios since they have to take into regard that irrational sentiment changes may affect the level of discount/premium. Discounts can be viewed as an equilibrium level of compensation in the market for systematic and unpredictable noise. For this mechanic to work out however it has to be assumed that noise investors have to prefer investing in CEFs over the underlying portfolios. If there is equal preferences between the two options, the NAV would exhibit unpredictable fluctuations akin to those that the theory. If this was the case the discounts would not be justified since noise trader risk is present in the underlying portfolio as well. An explanation is that noise traders are individuals who are unable to affect the prices of the portfolio but the shares of the CEFs themselves due to them being less liquid (Lee, Shleifer and Thaler , 1990).

Lee, Shleifer and Thaler (1991) present a series of evidence for their investor sentiment theory. First, they show that both the levels as well as the changes of monthly CEF discount levels significantly co-move with each other. They then move on and presents a series evidences supporting the individual sentiment theory such as new CEF IPOs, net redemption levels and small firm performance.

Anderson, Beard, Kim and Sten (2011) also find support for the role of investor sentiment. They found that there was a strong relationship between discounts and VIX after the initiation of the market meltdown in 2007. When consumer fear was elevated, the amount of discount rapidly rises. This implies that during a turbulent period, fund prices fall more rapidly than the NAV does (Anderson, Beard Kim and Sten, 2011).

3.2.2 Costly Arbitrage

Pontiff (1996) finds that costly arbitrage may induce discounts on traded CEFs. The old debate whether the market is efficient or not plays a big role on deciding if obvious arbitrage should be erased by market forces of not. There are market frictions in place however that leads to persistent mispricing. Pontiff (1996) divides these costs into transactional and holding types and argues that mispricing will be more severe for assets that are more costly to arbitrage since they will be subject to weaker

corrective arbitrage pressure. Examples of transaction costs are brokerage fees, market impact costs and bid-ask spreads. Holding costs include borrowing costs, opportunity costs and risk exposure. In the study, positive relationships are found between the absolute values of discounts and the difficulty to replicate the portfolio, for funds that pay out smaller dividends, for funds with lower market values and when interest rates are high. The study also took a closer look on how dividends affect the discount with the starting point that that the higher the dividend yield, the less costly arbitrage will be. Should an investor enter a short position in the underlying asset, he/she would be obligated to pay out dividends to the investor on the other side of the position. With high yields, this commitment will be easier to fulfill with smaller discounts as a result.

3.2.3 Diversification

A somewhat counter-intuitive argument for discounts is that heterogeneous perceptions of the underlying assets. While diversification is something that is sought after as it reduces systematic risk, some argue that it may be undesired for CEFs to hold a diversified portfolio. Researchers argue that higher diversification of the underlying assets in a CEFs portfolio increases discounts. A reason for this is that investors are only interested and willing to pay full price for a fraction of the CEF portfolio. The stocks in the CEF portfolio that are unfavorable for the investor are valued at a lower price and hence impose discounts. Miller (1977) argues that investors can pick stocks that are undervalued and achieve excessive returns over a time period. The reason for CEF discounts is that investors prefer investing in other specific stocks or industries that are even more under-valued compared to the CEFs. Chan, Kot and Li (2008) empirically links that a less diversified portfolio is more attractive for investors. The authors look at how the level of diversification within CEFs affect discounts on the Chinese market. Using the Herfindahl index, the authors find that there is a significant negative relationship between diversification and the discount.

3.3 Choosing the Rational Framework

Going forward, we choose the rational setting as the main focus of our study. We believe that doing so is not only, as the name suggests, logical but also provides a superior foundation for which we can build our hypotheses and statistical tests. As the variables that have been studied are common within finance literature it will also

allow us to draw from a broader base of knowledge. In addition, it is also of our opinion that the behavioral approach is not suitable for the Swedish context. The most well-known behavioral theory based on individual investor sentiment for example uses variables ranging from net redemptions of mutual funds to different small stock indices in order to measure sentiment. We do not contest their validity as proxies but argue that since both institutional as well as private investors alike invest in CEFs in Sweden as opposed to them mostly being retail products in the US, noise due to systematic mispricing is less likely to be a problem in Sweden.

4. Theoretical Framework

Rational explanations of discounts imply an efficient market. Assuming an efficient capital market in turn leads to the direct exclusion of all behavioral explanations presented in the previous section. Here we discuss the theoretical implications of an efficient market and the concept of abnormal returns onto CEFs. For a brief overview of the efficient market hypothesis and risk adjusted returns, see Appendix B.

4.1 Efficient Capital Markets Implications for CEFs

Whether the market is efficient or not is important when studying CEFs. Rational explanations rely on that all available information is incorporated into the CEF shares prices. Expected outflows of cash such as management fees and taxes from unrealized gains for example are adjustments that need to take place in order to arrive to the true value of the fund. This means that the NAVs reported by CEFs are overstated in the first place and that there is no discount per se.

Moving on, the practical implications of pricing models such as CAPM and the Fama-French Three factor model is that investors should only hold portfolios based on respective model's risk factors since they will explain most of any portfolio's behavior (Fama, 1979). Given that any investor can mechanically replicate the theoretically efficient portfolios without too much effort, what worth is there investing in CEFs?

What must also be emphasized in the Swedish context is that many of the CEFs are not pure funds in the classical sense. Given some of their histories, the funds are in many ways related to conglomerates. Investor AB for example has business and M&A teams that help their portfolio firms with both operational and strategic issues. Melker Schörling AB owns over 50% of Hexagon which gives them free reign when it comes to all decisions on corporate level. Capital infusions from CEFs into portfolio firms are not uncommon. The list goes on and one soon realizes that many CEFs in

our sample can generate value on a fundamental level in addition to pure stock picking. With this additional dimension of a potential source of added value, the idea of whether some CEFs should be able to generate abnormal returns or not becomes somewhat blurred. Leveraging their own knowledge of operations onto portfolio firms may lead to significant returns on the market. Having control over daily operations of portfolio firms can also mean that funds have inside information not available to the market.

Trading on insider information is forbidden but funds that are certain that divisions of portfolio firms are undervalued may for example choose to spin them off in order to realize hidden values. A good example would be Latour and Securitas. Since the former's decision to list Securitas on the Stockholm Stock Exchange, Latour has been involved in the processes of spinning off several divisions of Securitas. ASSA ABLOY AB[4], Niscayah[5], Securitas Direct and Loomis are examples that were distributed to shareholders of Securitas. ASSA Abloy AB's market value has since its listing at the end of 1994 grown at a staggering rate of 24% on an annual basis. Loomis has doubled its market value in just a few years and both Securitas Direct and Niscayah have been bought out of the stock market. Securitas itself has also gone through an admirable market value development, with its adjusted listing price of SEK 4 in 1991 to today's levels of around 60 SEK. On one hand, it is matter of discussion whether the market valued the Securitas divisions fairly or not before they were spun off. It is undeniable however that their price developments have beaten all comparable indices post-spin off.

The attentive reader may wonder why investors do not just replicate the CEF portfolios. NAV developments, including those generated by spinning off divisions, accrue to all shareholders that choose to hold onto the shares. The simple answer is that the thought is good but practically impossible, should the investor aim for a 100% tracking accuracy. First, CEFs only disclose their exact holdings once every quarter. They do not have any responsibility to report any trades that are not unusually big or involve either the acquisition or loss of controlling stakes in a company. This means that any unobservable changes in the underlying portfolio cannot be imitated until the next announcement and that not holding an up to date

[4] Previously known as ASSA AB
[5] Previously known as Securitas System

portfolio may mean a divergence in portfolio value. Second, individual investors cannot always access illiquid assets. While it is possible to gain exposure to certain industries and geographies by investing in listed peers, it cannot always be assumed that these exist or are good enough to replicate a CEF's illiquid assets. Third, while somewhat uncommon, CEFs may be the subjects of private placements in their portfolio firms. Investors that are in long positions of said firms may therefore be diluted in favor to the CEFs.

Knowing this, abnormal returns from some CEFs may not be subject to classic finance literature regarding passive portfolio holding. If nothing else, in the cases that they possess insider information of their portfolio firms in an otherwise semi-strong form market and the fact that they can enhance operational efficiency should put them in a good position from which they can generate substantial returns.

Access to illiquid assets is also a potential source of abnormal returns. The market cannot by definition price illiquid assets which can result in pricing inefficiencies. Skilled management may be able to identify good investment opportunities outside of the stock market and generate above par returns through them.

Following the rational trail of pricing based on expectations leads to the inevitable conclusion that the market's assigned discounts or premiums on CEFs should contain information regarding what they expect from the funds in the future and that past information may be used to form these expectations. Two types of tests on discounts then emerge; one that tries to explain past fluctuations and one that tests whether rational assumptions hold. The former type looks at information available to investors at any given date that could be useful in pricing the fund. The latter type tests the true implication of a rational market by checking if the market is efficient in pricing assets.

5. Hypotheses

In this section we present a series of hypotheses derived from the rational framework. We briefly summarize what we expect from each of the variables and state the null hypotheses as well as their alternate hypothesis counterparts. Rational hypotheses imply that CEF funds are not priced at discounts per se, the market just adjusts for factors that affect the expected value of the fund in line with the rational theories presented in section 3.

Hypothesis 1: Management fees are a positively correlated with discounts

Management fees are direct cash outflows from CEFs. As NAV snapshots only reflect the market's valuations of the underlying assets minus debt, costs such as management fees are ignored. Valuing a financial intermediary is different from operational firms in Hence, we argue that management fees are positively correlated with discounts. In particular, constructing a perpetuity variable of management fees should theoretically yield a perfect correlation with the size of exhibited discounts. We define the null-hypothesis for management fees as:

$$\boldsymbol{H_0 : \beta_{Management\ Fees} = 0} \text{ against } \boldsymbol{H_1 : \beta_{Management\ Fees}} > 0 \qquad (1)$$

Hypothesis 2: Managerial ability is negatively related to discounts

Our second research question concerns how managerial ability affects discounts. We expect it to be negatively correlated with the current level of discount. The skill level of management will be measured with past abnormal performance in our main regression. If past abnormal returns reflect the market's future expectations of performance then there should be a negative one-to-one relationship between the discounts and the average abnormal returns. Expected overperformance implies beating a benchmark index and consequently the discount rate associated with it. If the market expects a CEF to keep on generating positive NPV given a discount rate, the market will clear when there is none left as any economic profit would imply “free money” for sophisticated investors.

$$\boldsymbol{H_0 : \beta_{Managerial\ Ability} = 0} \text{ against } \boldsymbol{H_1 : \beta_{Management\ Skills}} < 0 \qquad (2)$$

Sub-hypothesis 2a: CEFs generate abnormal returns

A direct consequence of relating managerial ability to the discounts is checking whether CEFs generate abnormal returns. Assuming a semi-strong form of market

efficiency, CEFs' reason for existence is to generate abnormal returns relative relevant benchmarks. Since the Swedish CEF context differs from others due to them exhibiting traits of conglomerates, abnormal returns does not clash with our theoretical framework assuming that the capital market is not strong-form efficient.

$$\boldsymbol{H_0 : \alpha_{CAPM} = 0} \text{ against } \boldsymbol{H_1 : \alpha_{CAPM} > 0} \quad (3)$$

Hypothesis 3: Illiquidity Effects

Researchers have presented arguments for both negative and positive correlations between the ratio of illiquid assets and discounts. The first camp argues that valuation difficulties due to information asymmetry generate discounts while the other contends with that access to assets otherwise out of reach for the normal investor should command a premium.

$$\boldsymbol{H_0 : \beta_{Illiquidity\ Effects} = 0} \text{ against } \boldsymbol{H_1 : \beta_{Illiquidity\ Effects} \neq 0} \quad (4)$$

Hypothesis 4: NAV Dividend Yield

Dividend yield is expected to be negatively correlated to discounts since they are equivalent to partial liquidations of the funds. The ratio of cash paid out should therefore lead to an equal ratio of reduction in the discounts.

$$\boldsymbol{H_0 : \beta_{Dividend\ Yield} = 0} \text{ against } \boldsymbol{H_1 : \beta_{Dividend\ Yield} < 0} \quad (5)$$

Hypothesis 5: Discount levels contain information about expected future performance

Lee, Schleifer & Thaler (1991) as well as Pontiff (1996) correctly pointed out that a fitting test for the management performance hypothesis is to look at the relationship between the current levels of discount with that of future performance. They do so since a rational capital market price in expectations and not past performance. It is therefore of interest to run tests to see whether high (low) discounts predict low (high) future performance.

$$\boldsymbol{H_0 : \beta_{Current\ Discount} = 0} \text{ against } \boldsymbol{H_1 : \beta_{Current\ Discount} < 0} \quad (6)$$

6. Data sample & Selection

Our NAV, share price and discount sample is an unbalanced panel data set consisting of 11 of Sweden's traded CEFs. These are in no particular order Investor, Industrivärden, Kinnevik, Melker Schörling, Ratos, Latour Investment, Lundbergs, Öresund Investment, Bure Equity, East Capital and Svolder. The panel is unbalanced due to some of the funds not being listed until just a few years ago. While the cross-sectional size of the sample leaves some to be desired from an empirical standpoint, the listed funds amount for more than 95% of the total value of traded CEFs in Sweden. As the frequency of the data is on a daily level however, the lack of cross-sectional depth is compensated by the sheer number of observations in the temporal dimension. Our data is compiled using primary as well as secondary data sources such as Thompson Reuter's Datastream and FactSet.

An extensive effort has also been made to collect data from the studied objects' quarterly reports. Data collected from quarterly reports include management fees, number of shares of underlying stocks and the book values affixed to illiquid assets for all quarters for the past 12 years. NAV and discount series have been supplied by Svenska Handelsbanken's Equity Research department. Most of the discount and NAV series are from January 1st 1997 to February 8th 2013. Since some of the funds were listed after 1997, there is no data for them during earlier periods. We have however chosen to limit the studied time frame to January 1st 2000 to December 31 2012. This is done in order to balance the panel data and to make use of estimated coefficients based on the first part of the sample.

Criticism of Data

An issue when calculating the NAV is that investors only truly know what CEFs hold once every quarter when they present their portfolio compositions in the quarterly reports. The exact portfolio compositions and changes in the capital structures are not observable by the market until the next quarterly report which raises some uncertainty regarding the NAVs. Nevertheless, the market can only use information it has at its hands which in this particular context mean that the assumption of the portfolios staying the same until the next quarterly report is reasonable. The observable NAVs then only fluctuate with the prices of the underlying assets and announced acquisitions and/or mergers. Assuming constant portfolios over quarters also becomes less of a problem if one takes into regard the characteristics of many of

the funds; they are often long-term owners and rarely change their compositions drastically over short periods.

Another issue when compiling NAVs is how to value illiquid assets. Historically, most of the CEFs have valued these at acquisition costs which is inappropriate since doing it may give rise to heterogeneous valuations depending on who you ask. As there is no way to know their true values even at the CEFs' quarterly reports, we will assume the constant reported values over quarters and construct appropriate variables to check for their effects on the NAV. Some firms report "other assets", but do not specify whether these assets are illiquid or not. We assume that all assets that are not listed companies are illiquid. An issue with relying on information from quarterly reports is that some of the studied objects do not state whether they own A or B stocks in their reporting. When the stock class is not defined we use prices of the stock with the highest trading volume.

Relying on quarterly reports and other primary sources for data is optimal for a study of this nature. A difficulty when compiling the data set however is that there is no consistent reporting standards used by all CEFs. In addition, CEFs change their ways of reporting over time as a response to reporting standard changes and sometimes on seemingly arbitrarily whims. Reporting of management fees for example experience a sudden change 2005 due to listed Swedish firms having to adhere the IFRS, leading to much more transparent and easily understood reporting. Nevertheless, we do not believe that different ways of reporting is that much of a problem that it may sound like. If a market is efficient it acts on reported values and if reporting standards change, market participants' will correct the valuation of affected assets within a short time in order to reflect the new information gained.

The sample size can also be questioned since we only looked at 11 CEFs. However, since our sample represents more than 95 % of the total value of traded CEFs it would have been difficult to cover a larger sample in a Swedish context. On a firm specific level, East Capital and Melker Schörling differ from the other study objects. East Capital invests only in foreign funds. Melker Schörling is a semi-open CEF offering a redemption program where investors can redeem their shares at NAV once a year which may lead to a naturally low discount.

7. Method

Our hypotheses will be tested with multivariate panel regressions controlling for firm fixed effects[6]. The dependent variables are the discounts of the studied CEF sample. The data set is a panel consisting of N=11 CEFs for which T=1673 to 3389 depending on the fund (1st January 2000- 31st December 2012 for the full studied period).

7.1 Regression Specification

To design our main regression we derive an expression for the discount and decompose it to its components. First, net asset value of a CEF's portfolio is the market's valuation of the underlying assets' aggregated discounted future cash flow, minus the Net Debt of the firm. We use the notation presented by Kumar & Noronha (1992) with the addition of a ND term;

$$\boldsymbol{NAV} = \sum_{i=1}^{\infty} \frac{CF_t}{(1+r)^i} - ND \quad (7)$$

The discount of a fund is the difference of the market value of the fund's asset and the price that the market pays for the fund's shares.

$$\boldsymbol{Discount} = NAV - Market\ Value \quad (8)$$

Assuming a rational market, CEFs should be valued at NAV minus the components that are not attributable to the shareholders of the fund. Since CEF tax laws are different in Sweden compared to the US we will not consider the tax implications.

$$\boldsymbol{Market\ Value} = \left(\sum_{i=1}^{\infty} \frac{CF_t - Mngmnt\ Fees_t}{(1+r)^i} + Managerial\ abilities_t - Dividends_t + Illiquid\ Assets_t - ND\right) \quad (9)$$

With the NAV and Market Value expressed in this way, the discount can be expressed as the PV of expected management fees, expected performance, minus the dividends plus the effects of holding illiquid assets.

$$\boldsymbol{Discount} = \sum_{i=1}^{\infty} \frac{-Mngmnt\ Fees_t}{(1+r)^i} + Managerial\ abilities_t - Dividends_t + Illiquid\ Assets_t \quad (10)$$

$$\boldsymbol{Discount} = \alpha + \beta_1 * Mngmnt\ Fees_{it} + \beta_2 * Managerial\ Abilities_{it} + \beta_3 * Illiquid\ Assets_{it} + \beta_4 * Dividend\ Yield_{it} + \beta_5 * Traded\ Volume_{it} + Firm_i + \epsilon \quad (11)$$

In order to make it easier to interpret the regression results we divide all terms with the NAV in order to make all variables directly comparable with each other.

[6] Fixed Effects was chosen over Random Effects after running Hausman tests on our specifications.

$$\textbf{Discount}\ \% = \frac{\sum_{i=1}^{\infty} \frac{-Mngmnt\ Fees_t}{(1+r)^i} - Dividends_t + Illiquid\ Assets_t}{NAV_t} + Managerial\ abilities_t \quad (11)$$

The final specification then becomes:

$$\textbf{Discount}\ \% = \alpha + \beta_1 * PV\ Mngmnt\ Fees\ \%\ of\ NAV_{\ it} + \beta_2 * Managerial\ Abilities_{it} + \beta_3 * Dividend\ Yield_{it} + \beta_4 * Illiquidy\ Ratio_{it} + Firm_i + \epsilon \quad (12)$$

In addition to studying the fluctuations of discounts over time we also examine whether rational assumptions hold by testing for the relationships of discounts to future performance and costs.

$$\textbf{Actual abnormal returns}_{i,t+1} = \alpha_{it} + \beta_{it} * Current\ Discounts_{it} + Firm_i + \epsilon \quad (13)$$

$$\textbf{Discount}_{it} = \alpha_{it} + \beta_{it} * Actual\ Management\ Fees_{i,t+1} + Firm_i + \epsilon \quad (14)$$

In other words, we test the predictive power of current discounts on future abnormal returns. Rational investors price assets according to expected returns. If discounts are related to future abnormal returns then rational expectations are efficient. Constructing a management fee variable that is the present value of actual future management fees will also allow for us to see how much of today's discount levels are explained by them. An efficient market will be able to estimate these costs and incorporate them into today's prices.

7.2 Construction of Variables

Management Fees

We construct three different variables for management fees. Our first variable assumes a fixed yearly management fee relative to NAV based on the last year's ratio. Annual fees from public reports are extracted and divided with the average NAV of last year. Using the risk free rate as discount rate, we receive the PV of all future management fees expressed as a percentage of the fund value.

$$\textbf{1.}\ \textbf{PV Management Fees}_t\textbf{/ NAV (Fixed ratio)} = \frac{\frac{Annual\ management\ fees_t}{Average\ NAV_{t-1}}}{r_f} \quad (15)$$

The second variable for management fees is defined as a rolling percentage of the NAV, discounted in the same way as the above variable;

$$\textbf{2.}\ \textbf{PV Management Fees}_{t-1}\textbf{/NAV}_t\ \textbf{(Rolling ratio)} = \sum_{i=1}^{\infty} \frac{\frac{Annualized\ quarterly\ fees_{t-1}}{Average\ NAV_{t-1}}}{(1+r)^i} \quad (16)$$

We also construct the expense ratio defined by Ross (2002). The ratio relates the expenses of a fund to the sum of the expense fraction of NAV plus the NAV dividend yield.

$$\boldsymbol{Expense\ ratio} = \frac{Expense\ Fraction}{Expense\ Fraction + NAV\ Dividend\ Yield} \quad (17)$$

Managerial Ability

We use CAPM alphas a risk-adjusted performance measure to proxy the managerial ability of the CEF managers;

$$\boldsymbol{CAPM\ NAV\ Returns} = \propto + rf + \beta(rm - rf) \quad (18)$$

$$\boldsymbol{Managerial\ skill} = \alpha \quad (19)$$

Time variability of skill

To construct the time variability of management skills we extract rolling alphas on the temporal dimension. By treating skill as a potentially time dependent variable, it will allow for the market to adjust its expectations of fund managements and respond accordingly when pricing the funds.

Distribution policy – Dividend Yield

Our dividend yield variable is the expected dividend per share divided with the price of the NAV per share;

$$\boldsymbol{NAV\ Dividend\ Yield_t} = \frac{Expected\ Annual\ Dividends\ Per\ Share}{NAV\ Per\ Share_t} \quad (21)$$

Illiquidity ratio

The liquidity factor is defined as a ratio of illiquid assets and the total assets of the portfolio;

$$\boldsymbol{Illiquid\ Assets\ Ratio} = \frac{Illiquid\ Assets\ Value}{Total\ Portfolio\ Value} \quad (22)$$

Actual managerial skill

We construct the actual abnormal returns of CEFs during 6- and 12-month periods. These are then benchmarked against the CAPM's predicted returns for 6- and 12-month returns based on betas calculated with the daily rolling windows of 6-, 12-, 24-, 36-month windows as well as using the whole sample.

$$\boldsymbol{CAPM\ predicted\ returns_t} = r_f + \beta_{Rolling\ window}(r_m - r_f) \quad (23)$$

$$\boldsymbol{Actual\ Abnormal\ Returns_t} = R_i - (r_f + \beta_{Rolling\ window}(r_m - r_f) = \alpha_{actual} \quad (24)$$

Actual management fees

We construct the after-the-fact present values of actual costs. We do so by discounting future annual fees to the beginning of each year. For example, the present value of management fees in 2000 are the discounted values of the actual costs in 2001, 2002,…,2012 and so on. A perpetuity will replace the actual fees at the end of the series.

$$\boldsymbol{PV\ Actual\ Management\ Fees_t} = \sum_{i=t+1}^{\infty} \frac{Management\ fees_i}{(1+r_f)} \quad (25)$$

7.2 Robustness Tests

In addition to our main regression, we will perform a series of robustness checks in order to complement our base specification. We do so in order to validate the structural validity of our specifications. First, it we construct substitute variants of our variables when possible and create a number of regression specification matrices. Second, we will see how our main coefficients behave when adding additional controls not part of the main specification. These controls

7.2.1 Regression Groups

Some of our constructed variables are substitutes rendering them mutually exclusive from each other. In order to check for sensitivity regarding the specifications of variables we construct a number of variations of our managerial ability and management fee variables. Managerial abilities will also be constructed in three ways. In addition to extracting the constants of the pricing models, we will run the regressions on different daily rolling basis. Alphas will be estimated for 6-, 12-, 24- and 36-month windows in addition to the sample recursive ones.

We also estimate managerial ability using daily, 6-month and 12-month returns, resulting in 45 variants of our main regression. We organize the regression groups according to the type of returns that they are based on which gives us three groups. Each of these groups is in turn divided into three sub-sets of regressions. Each sub set uses one of our three management fee variables and five different CAPM estimation windows. Regression group 1 use daily excess returns when estimating CAPM coefficients while 2 and 3 use 6- and 12- month equivalents.

8. Descriptive Results

8.1 Cross-Sectional Discount Characteristics

The mean discounts of our studied sample differ greatly. Investor has the highest mean discount at 30% while Melker Schörling has the lowest mean discount of 2% among the traditional type of investment companies. Ratos, a private equity firm, has a negative mean discount of 11%. There also seems to be a big spread when it comes to the coefficients of variation of the discounts. The larger CEFs such as Kinnevik, Investor, Industrivärden and Lundbergs have the lowest coefficients that all lie in the span of 0.18 to 0.26. The most likely reason for this is because these companies have large and stable holdings, while also being the most traded. An exception from this rule is Melker Schörling, which showcases the highest coefficient of 2.88. This may be attributed to its very small effective free float ratio of stocks; the main owner Melker Schörling owns almost 85% of the stocks. Adding other large long term owners' shares, barely 5% of the stocks circulate on the stock exchange. Relatively low market activity may therefore induce larger movements in the discount than for those with more liquid stocks. Ratos is also an exception; with a coefficient of -2.44. Ratos has wildly overperformed benchmark indices in the past but took a large blow during the latest financial crisis, transforming their long-time premium into a discount in a rather volatile manner.

Most discount distributions are only lightly skewed with skewness values between -0.8 to 0.9. The only series that stands out is Bure's with a skewness of 1.68, implying that its values are heavily concentrated on its left tail. The same pattern can be found in their kurtosis levels. All firms except for Bure show kurtosis of 2.0-4.3, while Bure sticks out with a Kurtosis of 6.36. For more descriptive statistics, see tables 1 to 5 in Appendix A.

A pair-wise correlation matrix shows that the discounts do not tend to move with each other in either direction. The highest correlation coefficients for both signs top at roughly 0.6. This indicates that the discount may be dictated by firm specific factors. This is not a surprise as many have portfolio compositions that differ from each other considerably. It is also aligned with the supposition that CEF specific management fees, managerial ability and dividend yields affect discounts. Constructing the pair-wise correlation matrix for changes in discounts yields the

same result in the sense that correlations are sporadic and weak in magnitude with most of the coefficients remaining insignificant.

9. Results and Discussion

The results of the rational tests are presented and analyzed below. First we examine if CEF managers have managed to generate abnormal returns in the past. The second sub-section deals with our main explanatory regressions of how well our studied variables are related to the fluctuations of discount levels. Finally, the third part will elaborate upon the findings of our tests of rational assumptions and the discount levels' ability to predict future abnormal returns and cost levels.

9.1 Abnormal Returns

A first step before moving onto our main regressions is to check if CEF managements can generate risk-adjusted abnormal returns by testing our sub-hypothesis 2A. Running daily rolling CAPM regressions on our sample gives us over 30 000 CAPM alpha estimates per return and estimation window. Since we estimate CAPM coefficients for three kinds of returns using five different estimation windows for each fund it will be impossible for us to present all of our results. To get an idea on how our sample performs against the market we choose to present the CAPM constants and their t-stats for annual returns on a daily rolling basis using an estimation window of 36 months.

Graphs 1 to 11 in Appendix A show the CAPM alphas together with their t-stats plotted over time. We see that the absolute values of these are deeply significant for all firms. It is also clear that their market relative performances change over time. The biggest funds, Investor and Industrivärden, seem to be oscillate around the zero line which is expected since their portfolio firms are among the biggest and most liquid stocks on the market. Other CEFs like Ratos and Latour have outperformed the market substantially during certain periods with their annual abnormal being 30-40% at their best. Other CEFs such as Svolder and East Capital Explorer seem to systematically underperform the market. These results are interesting considering what the two that are most aligned to the definition of "stock pickers", Svolder and East Capital Explorer, seem to struggle with beating the market index. This is a sign of a semi-strong market where there is no added value of analyzing fundamental information. In contrast, some of the CEFs that are close in nature to conglomerates,

such as Ratos and Latour, show very high abnormal returns during certain periods historically.

Substantial differences on performance in the cross-sectional level are good for our later study on how it affects the level of discounts. Regarding hypothesis 2A that asks whether CEFs generate abnormal returns, we conclude that abnormal performance is time-variant and that even funds that have over performed in the past may dip into negative abnormal returns as evidenced by Graphs 1-11 in the Appendix.

9.1.1 Robustness Check

We choose the CAPM as the sole benchmark due to the special characteristics of several CEFs in our sample and because of the scope of our study. While US CEFs are mostly retail products, Swedish CEFs are often long-term and active owners in their investments. The majority do trade stocks on the market but the largest CEFs rarely sell off stakes core investments. With generally lower portfolio turnover, they are farther from their OEF brethren and closer to strong owners. Risk loading per se in order to get higher returns is less of a concern when thinking about how they generate capital gains. Nevertheless, they are in the end another form of a fund and should therefore be evaluated against appropriate pricing models. One such example is the Carhart 4-Factor model which basically is the Fama-French 3-Factor model with an additional Momentum factor added. More information regarding the construction of the Fama-French factors can be found in Appendix B.

It is outside of this study's scope to construct these factors on a daily level. Instead we make use of an already constructed set of monthly returns for the additional factors by Stefano Marmi[7] that include the extra factors of Fama and & French's model as well as the Momentum factor for the Swedish market. We use these to check whether our CEF sample's significant CAPM abnormal return disappear or not. Using 4-year estimation window due to the smaller amount of observations available we estimate the model's monthly alphas. The results can be viewed in graphs 12-22. To summarize, the results don't change too much. Most graphs show similar patterns to those of the CAPM time series. While the t-stats are generally weaker than the ones for our CAPM regressions, they are still significant with the exception for when trends reverse. In other words, CEFs' performances seem to be time variant when using the C4F model as well.

[7] http://homepage.sns.it/marmi/Data_Library.html#Sweden

9.2 Main Regressions

Below are the regression results from five of our regressions. These all include our four main variables of interest; managerial ability, management fees, the dividend yield and the illiquidity ratio of assets. This particular set of regressions is the first set in regression group 2 whose CAPM alpha estimates are estimated on 6-month fund and market excess returns. We choose this return window since it is the middle ground between our daily and 12-month returns based estimates. Estimates based on daily returns may also be subject to bid-ask bounce noise effects on closing prices which could potentially distort the results. The five regression specifications differ from each other by using different rolling windows when estimating the CAPM alpha.

Table 1- Managerial ability estimated by CAPM using 6 Month Excess Returns, Management Fees (1)[8]

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	-0.045***	-0.071***	-0.067***	-0.161***	-0.155***
t-stat	(-10.32)	(-13.47)	(-10.96)	(-21.03)	(-17.92)
Management Fees (1)	0.024***	0.021***	0.019***	0.011***	0.011***
t-stat	(12.65)	(11.42)	(10.04)	(5.80)	(5.88)
NAV Dividend Yield	-1.449***	-1.451***	-1.427***	-1.288***	-1.354***
t-stat	(-30.74)	(-30.84)	(-30.33)	(-27.51)	(-28.8)
Illiquidity Ratio	-0.111***	-0.107***	-0.112***	-0.115***	-0.122***
t-stat	(-20.17)	(-19.3)	(-20.35)	(-20.98)	(-22.24)
Constant	0.371***	0.370***	0.369***	0.350***	0.370***
t-stat	125	125.08	124.54	92.4	125.29
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.6453	0.6461	0.6455	0.6534	0.6476
Observations	32388	32388	32388	32388	32388

9.2.1 Managerial Ability

Table 1 show that the coefficients for managerial ability are all significant at a 1% significance level in contrast to Malkiel's (1977) insignificant results and in line with. The signs of the coefficients are all negative which is in line with our hypothesis of higher managerial skill having a negative effect on discounts. CEFs that outperform the market have lower discounts on average, while CEFs that underperform are penalized with higher discounts. The magnitudes of the coefficients vary depending on which CAPM alpha estimation window one chooses to use. Using alphas extracted

[8] Fixed Cost Ratio

from longer CAPM estimation periods seems to result in higher magnitudes of the coefficients. The alphas from the 6-month estimation window for example results in a coefficient of -0.046 while using the whole sample from 1997 yields a coefficient of -0.155, translating into either a negative 0.046 or 0.155 percentage point decrease in discounts for every additional percentage point to the average 6-month abnormal return. The implication is that the market seems to reward funds that have done well over a long time with lower discounts compared to those that only do well in the short-run. This may also imply a reputational effect; the market recognizes those who have done well on average in the past and reward them accordingly.

Under the assumptions that past returns reflect expected returns and that managerial ability is the only measure of interest, the managerial coefficient should be close to -1 since all abnormal returns directly contribute to positive NPV. Our model assigns a hefty discount on the variable however, rewarding funds only a fraction of past abnormal returns. If past returns are the only factor that the market looks at when forming expectations regarding future performance it means that the market is underpaying for expected abnormal returns. Most likely the market takes into regard other factors than just past performance when pricing the funds, leading to a rather weak effect of the measure. We therefore reject our null hypothesis for hypothesis 1 and accept our alternative hypothesis; that managerial higher managerial ability seems to lead to lower exhibited levels of discount.

9.2.2 Management Fees

Moving on to our management fees variable we note that the coefficients are all positive and highly significant, as shown in Table 1. The magnitudes of the coefficients are rather low, ranging from 0.011 to 0.024. This is surprising since the measure is the relative size of the perpetuity of our measure of management fees to the NAV, implying that there should be a one-to-one relationship between the two. Instead, our results point at a much weaker correlation where a percentage point increase in the costs only leads to a 0.011-0.024 percentage point increase in the discounts. While this does not make much sense theoretically we believe that that difficulty to assess an accurate management fees ratio is the root of the problem. Unlike OEFs, CEFs do not have explicit fees observable for investors. Instead, they report costs like most operational firms through quarterly and annual reports. Our management fees variable has been constructed by extracting direct administration

and operational costs from the income statement costs of the CEFs. These costs however are not linearly related to the NAV and may be affected by factors not observable by the market. Unlike OEFs, CEFs do not have explicit fees stated in terms of NAV that they charge. Spikes in management fees for some years could for example be bonuses based on internal performance goals. It is also hard to estimate the total value of compensation to management since non cash remuneration such as stocks and options programs are hard to quantify. Nevertheless, we accept the alternative hypothesis we state for the management fees. The results are in line with Kumar & Noronha (1992) and in contrast to the insignificant results of Malkiel (1977).

An issue with the management fees variable when using PV of future management fees is the discount rate. We assume the risk free rate to be a proper discount rate since observed management fees only increases slightly over the year in absolute terms. Assuming long-term management contracts the outflow of cash flow can be treated as a riskless perpetuity. During recent years however the risk free rate has decreased to very low levels. This becomes somewhat problematic when discounting future management fees since discounted management fee perpetuities become very large during a period where discounts levels have stayed somewhat stable.

9.2.3 Illiquidity Ratio

Table 1 illustrates that the illiquidity ratio coefficients are significantly negative on 1% significance levels with magnitudes between -0.111 to -0.122. Negative signs on the illiquidity coefficient mean that the market on average has paid a premium to access illiquid assets. Our findings support the liquidity-based model developed by Cherkes, Sagi and Stanton (2009), stating that it is more cost efficient for investors to invest in illiquid assets through a fund. Another reason for the negative sign on the illiquidity coefficient could be a valuation mismatch between investors and CEFs, where investors value CEF's illiquid assets at a higher price than the reported values. When comparing results over different time periods for the CAPM measure and different management fees variables, we see that the results are consistent. The coefficients stay significant and negative for all regressions and time periods. Coefficients vary from -0.08 to -0.11 for the regressions performed with different time periods. Our third hypothesis is therefore confirmed for a negative sign.

9.2.4 NAV Dividend Yield

The NAV dividend yield is a straight forward measure since it can be seen as a partial liquidation for the fund. Higher yields should therefore translate into lower discounts in line with Malkiel's (1977) reasoning. Table 1 shows that the coefficients are all negatively significant at a 1% level land between -1.288 and -1.451 in magnitude, implying that for every percentage point of NAV dividend yield, the discount decreases with a multiple between 1.288 and 1.451. While the negative sign is expected, the coefficients being larger than 1 is quite puzzling since the implication of this result is that investors are willing to pay a premium for the cash received. A possible explanation could be that investors interpret high dividend yield as a signal of strength. Nevertheless, hypothesis 4 is confirmed and its null hypothesis rejected.

9.3 Explanatory Power of the Model

Our models have rather high Adjusted R-Squares meaning approximate fittings of the actual values. See graphs 1-5 in Appendix A for scatter plots of the fitted and actual values. The biggest weaknesses of our models are that it cannot explain very high or very low values of discounts as evidenced by the plots. Our other specifications' plots look different but the explanatory power are roughly the same.

9.4 Alternate Specification Results & Robust Standard Errors

The results of all of our 45 variations of the main regression are presented in Tables 1 to 9. Most of the results are in line with above analysis with two categorical exceptions. Our expense ratio constructed by dividing our estimated expense as a fraction of NAV divided with itself plus the NAV dividend yield very unstable results. In some cases it has a negative sign which is not in line with theory. We attribute its noisiness to the fact that some firms drops in and out of paying dividends which results in the measure predicting a theoretical 100% discount. Another issue could be that since some funds have very little expected expenses, the dividend yield effect in the variable dominates the expenses, leading to a negative sign which is not what Ross (2002) theorized. All regressions have used robust standard errors in order to take into account for heteroskedacity. We have also run the regressions with bootstrapped standard errors using 10 000 resampling repetitions with no noticeable effects on our results.

9.5 Additional Robustness Tests

In addition to the main regression, a number of alternate regression specifications have been employed in order to test the structural validity of our approach. All of our robustness test results are presented in the table below. We have chosen specification (B) from regression group 2 (see Table 2 below) as the base regression specification from which we implement our changes. Five additional specifications are then constructed from it.

Table 2: Robustness Checks

	First difference alpha	Squared Illiquidity	Trading Volume	Without MSAB	Interaction
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	-0.070***	-0.059***	-0.074***	-0.071***	0.094***
t-stat	(-13.41)	(-11.11)	-13.85	-13.47	9.53
Managerial ability FD	-0.086				
t-stat	(-1.09)				
Management Fees (2)	0.021***	0.022***	0.020***	0.021***	0.019***
t-stat	(11.44)	(11.63)	(10.60)	(11.42)	(10.03)
NAV Dividend Yield	-1.450***	-1.425***	-1.475***	-1.451***	-1.557***
t-stat	(-30.82)	(-30.39)	(-30.75)	(-30.84)	(-33.07)
Illiquidity Ratio	-0.107***	0.091***	-0.110***	-0.107***	-0.100***
t-stat	(-19.31)	(6.99)	(-19.52)	(-19.30)	(-18.10)
Illiquidity Ratio Squared		-0.221***			
t-stat		(-16.72)			
Trading Volume			-0.005***		
t-stat			(-9.90)		
Interaction (Illiquidity and Managerial Ability)					-0.284***
					(-19.62)
Constant	0.284***	0.369***	0.326***	0.371***	0.368***
t-stat	(87.26)	(125.12)	(61.90)	(125.08)	(124.73)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.646	0.649	0.649	0.646	0.650
Observations	32381	32388	31116	32388	32388

First, we add a first difference equivalent to the managerial ability in order to remove any long term effects that our alphas may have on the discounts. Doing so does not change the results much; all coefficients retain their signs and while the managerial ability coefficient's t-stat has weakened, it is still significant at a 1% significance level.

The coefficients and t-stats are presented under specification (A) in above table. The first differences variable is not significant at any level.

Next, we add a squared version of the illiquidity ratio in specification (B) in order to control for any quadratic effects. The rationale for doing so is because of the competing theories regarding the measure. On one hand, investors may be prepared to pay a premium to otherwise inaccessible assets. On the other hand, the market assigns a discount to these assets due to difficulties with valuation of illiquid assets. Adding the squared coefficient will allow us to check if the effect of illiquidity changes depending on its level.

We observe that there indeed is a quadratic effect on discounts stemming from the ratio of illiquid assets a CEF invests in. The original illiquidity ratio coefficient changes signs to positive while the coefficient for the squared variable is negative. Both coefficients are significant at a 1% significance level and none of the other coefficients change signs or drop out of significance. The illiquidity ratio from previous specifications changes signs to positive and predicts a 0.091 percentage point increase of discount per unit increase of illiquidity. The squared coefficient predicts a -0.221 per squared unit increase. Hence, discounts are implied to increase with lower levels of illiquidity until it hits a point where it starts lowering it instead. Our model implies this happens at an illiquidity ratio of 41%. In other words, CEFs with a fraction of illiquid assets up to 41% suffer from increased discounts and vice versa. One explanation could be that CEFs with high ratios of illiquid assets are pressured into having more transparent reporting of their underlying assets than CEFs with low ratios of illiquid assets. If this holds, the hypothesis of discounts arising due to valuation difficulties may hold true. Ratos, a CEF investing only in illiquid assets, for example provides rather detailed earnings and balance sheet reports of their assets. By alleviating information asymmetry, the market becomes more inclined to value the assets at higher levels.

We have also run regressions on our base specification with an additional measure of logged trading volume. While there is no rigorous theory behind the measure we believe that adding it as a control may be useful since higher volumes may reflect institutional activity. Although a bit far-fetched, higher activity could be linked to higher levels of knowledge about the fund and therefore more efficient pricings. Like the other controls mentioned in this section, adding a trading volume variable does

not change any of the signs of our main variables nor does it affect their significance much. The trading volume itself has a significant negative impact. The magnitude is rather weak though, with an expected decrease of 0.005 per unit increase of volume. The sign of the coefficient also makes economic sense if investors value the option of quickly being able to get out of the fund by selling it on the stock market.

Our fourth change in the setup is to drop one of our funds from the sample. Melker Schörling AB. While it is a traded CEF like the others, it has since its inception had a yearly redemption program where it offers its shareholders to redeem their shares in the company during certain windows of the year. This unique characteristic makes it a hybrid CEF/OEF. Looking at the cross-sectional descriptive statistics for the funds reveals that Melker Schörling AB has amongst the lowest discount means. Since it can be argued that their low discounts is a result of them being a semi open-ended fund, excluding them from the sample may remove some disturbances. The results are presented under specification (D). The results do not change much in either magnitude or significance which implies a rather stable base specification.

Finally, CEFs specializing in illiquid assets may also as discussed above be good at identifying market inefficiencies and exploit them, implying potential interaction between the two. Should they be related then they could also have a joint negative effect on the levels of discount. We therefore construct an interaction variable by multiplying our illiquidity ratio with our managerial ability variable. The interaction term is strongly significant and negative. Economically, this means that higher past average abnormal returns and illiquidity ratios, the lower the discounts. This supports the idea of that the CEFs with high ratios of illiquid assets to total assets generate abnormal returns by successfully identifying and pursuing deals on the illiquid market. Our managerial ability coefficient becomes significantly positive however which is unexpected with the interaction variable taking away from it both some significance level and explanatory power.

Above robustness tests have also been run on the other 40 variations of our main regression. For the sake of brevity we will not present the results in table form but the general trend is that the variables of managerial ability, NAV dividend yield and illiquidity ratio stay roughly the same, although the sign of the managerial ability coefficient change every now and then. The management fee measures however fluctuate wildly in and out of significance while also switching signs in some tests.

This is most likely because of the previously discussed difficulty to correctly estimate the costs of the funds.

The Adjusted R-Squares do not change much when adding and removing variables which means that they do not add much explanatory power to the model overall.

9.6 Discounts and Performance Expectations

Above regressions mostly return results that are in line with theory. The independents used are all past information observable by the market however. Lee et. al (1991) as well as Pontiff (1996) point out that tests of relationships between historical information and discounts are not the true tests of market rationality; pricing efficiency of CEFs is reached when the market takes into regard all available information and use them to predict future performance. This line of reasoning inevitably arrives to the conclusion that current discount levels should contain information about expected future performance that is not already priced by already observable predictive variables such as past performance. In this section we test hypothesis 5 by first relating current discounts with that of lagged realized abnormal returns and then robustness check our findings by doing the same with lagged average abnormal returns. Running a regression of discounts onto actual abnormal returns is a refinement of the previously employed method used by Chay & Trzcinka (1999)[9], which we will use as a robustness test instead. Our actual abnormal returns are calculated by deducting the funds' excess returns with its predicted CAPM risk-adjusted market excess returns. Average abnormal returns are CAPM regression constants.

Table 3: Relationship between Discounts and Actual Future 12-month CAPM Abnormal Returns

	12-months excess returns alphas				
CAPM Estimation Window	**6 Months**	**12 Months**	**24 Months**	**36 Months**	**Whole Sample**
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Current Discount	-0.300***	-0.300***	0.293***	-0.275***	-0.300***
t-stat	(-18.70)	(-18.78)	(-18.38)	(-17.23)	(-18.88)
Constant	-0.102***	-0.101***	-0.106***	-0.108***	-0.106***
t-stat	(-13.37)	(-13.29)	(-13.98)	(-14.42)	(-13.98)
Adj R-Squared	0.398	0.400	0.401	0.381	0.406
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Observations	31421	31421	31421	31421	31421

[9] As suggested by our tutor Francesco Sangiorgi

Running our tests of current discounts levels onto lagged 6- and 12-month actual abnormal returns based on 6- and 12-month returns of the funds yields significant negative coefficients. Above table presents the results of regressing our Current Discount variable on to 12-month lagged realized 12-month abnormal returns. All specifications predict approximately 0.300 percentage point decreases of 12-month abnormal returns with each percentage point of discounts. The results are in line with expectations and imply that current discounts serve as partial predictors of future abnormal returns which is a sign of an efficient market.

To test the robustness of our results we also run the regression specifications of Chay & Trzcinka (1999) by regressing current discount levels onto the future CAPM regression constants. This approach is less precise than our previous regression in the sense that it only relates current discount levels onto the average levels of abnormal returns over a period instead of actual levels. The regression specification regresses current levels of discount onto the one-, two- and three- year lagged CAPM constants. We are careful not to estimate coefficients using an estimation window that goes back and beyond the date for the studied discount level. For example, for the one year lag regression, we only test for alphas estimated using estimation windows of maximum twelve months back. We put this restriction on our test because we are only interested in time windows where the market does not know how CEFs will perform, i.e. testing its ability to forecast.

Table 4: Relationship beween Discounts and Future CAPM Alpha (1 Year Lag)

	1 Year Lagged Alphas / 12-month excess returns	
CAPM estimation window	**6 Months**	**12 Months**
Coefficient	**Specification (A)**	**Specification (B)**
Current Discount	-0.093***	-0.121***
t-stat	(-32.06)	(-37.42)
Constant	0.160***	0.162***
t-stat	(220.94)	(223.12)
Time Dummies (Yearly)	Yes	Yes
Adj R-Squared	0.5127	0.5185
Observations	29628	0.1217

Named Table 23 in Appendix

Table 5: Relationship between Discounts and Future CAPM Alpha (1 Year Lag)

	2 Year Lagged Alphas / 12-month excess returns		
CAPM estimation window	**6 Months**	**12 Months**	**24 Months**
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**
Current Discount	-0.028***	-0.048***	-0.134***
t-stat	-8.51	(-12.56)	-27.53
Constant	0.157***	0.159***	0.164***
t-stat	200.60	(200.26)	(202.55)
Time Dummies (Yearly)	Yes	Yes	Yes
Adj R-Squared	0.4716	0.4733	0.4848
Observations	26768	26768	26768

Named Table 24 in Appendix

Table 6: Relationship between Discounts and Future CAPM Alpha (1 Year Lag)

	3 Year Lagged Alphas / 12-month excess returns			
CAPM estimation window	**6 Months**	**12 Months**	**24 Months**	**36 Months**
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**
Current Discount	0.030***	-0.019***	-0.126***	0.091***
t-stat	(8.38)	(-4.55)	(24.46)	(12.47)
Constant	0.156***	0.158***	0.194***	0.151***
t-stat	(190.25)	(191.18)	(194.09)	(162.39)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes
Adj R-Squared	0.440	0.4428	4560	0.4459
Observations	23897	23897	23897	23897

Named Table 25 in Appendix

The results of our tests vary depending on which lag is studied. Regressing current discount levels onto one year lagged alphas estimated using 12-month excess returns for one year lagged alphas show results in line with that of Chay & Trzcinka (1999) with a negative sign. The estimates for two year lagged tests are somewhat weaker but still negatively significant. The three year lagged results are more sporadic and have weaker t-stats, lower explanatory power as well as having inconsistent signs on the coefficients. All in all the results become weaker the longer the lags.

9.7 Discounts and Management Fee Expectations

Our final test looks at the relationship between discount levels and the present value of actual annual management fees. We look at annual values since quarterly costs are too noisy. Actual management fees constructed according to equation (26) and then divided with the NAV. Regressing the ratio onto the discount should then lead to a perfect relationship if the fees are the only factor that matters.

Table 6: Relationship between discounts and future management fees

Coefficient	Actual fees
PV Actual management fees (% NAV)	0.0554
t-stat	(1.11)
Constant	-0.0049
t-stat	(-0.25)
Firm Dummies	Yes
Adj R-Squared	0.5552
Observations	127

Running our test shows that while the coefficient has the expected sign, it is insignificant. Graph 6 in Appendix A shows the scatter between our constructed PV variable and the discounts. Again, we believe that using the risk free rate messes up the results while at the same time management fees being hard to extract. We do not interpret this result in any way since the results may very well be due to noise.

10. Conclusions and Implications

The nature of CEF discounts has been a hot topic of discussion amongst both among private investors, analysts and researchers alike. There have been no consensus on explanations for the discounts, and even though researchers have provided significant results of factors linked to discounts, no one has been able to fully explain the reasons for discounts. In this thesis we aim to analyze the CEF discounts in two ways. First, we provide a qualitative overview of the Swedish CEF context in order to build a theoretical framework. Second, we attempt to empirically link relevant factors to discounts. In order to answer how these factors affect discounts we run a number of regressions using a sample of 11 Swedish CEFs. Our first set of regressions test whether the market uses known information to price discounts. Next, we also check if there is predictive information contained within discounts. We also see if the Swedish CEF sample has been able to generate abnormal returns over the studied period.

Our results show that past overperformance leads to lower levels of discounts today while management fees have a weak positive impact. As for how well the CEFs perform, our results point at that they indeed are able to outperform the market with the exception of a few that coincidentally are the ones that are the closest to being stock pickers in the sample. The NAV dividend yield has a strong negative effect on discounts that is robust throughout all of our tests. The ratio of illiquidity also tends

to have a negative impact on the level of discounts. Constructing tests on if current levels of discounts contain information about future abnormal performance resulted in significant negative relationships. Most of our findings are in line with what our theoretical framework predicts by lending support to our stated hypotheses. Constructing an actual management fees present value term however did not yield significant results when they were regressed onto the discounts. While theoretically sound, we suspect that low bond rates lead to noisy results that cannot be interpreted in any meaningful way. The overall results are all in line with theory and seem to confirm much of what Malkiel (1977) reasoned but failed to prove as well as confirming later studies conducted by Kumar & Noronha (1992) and others regarding management fees as well as reinforcing the importance of fund performance as concluded by Stanton & Richard (2007) and Chay & Trzcinka (1999).

The results mostly being in line with our hypotheses have several implications. First, the fact that discounts are correlated with our main variables implies that the market readily uses available information on the market to price CEFs. This supports the assumption of a weak-form of market efficiency in Sweden. If this is true then we have found some proof against the behavioral branch of research. In fact, while not our main focus, we performed an initial test of the investor sentiment theory in Tables 6 and 7 in Appendix A. The theory predicts systematic movements in discounts to reflect the aggregate investor sentiment but we do not see any for our sample. The sample used unfortunately limits the applicability of our results onto the aggregated universe of CEFs. Since our study covers the whole CEF landscape of Sweden, the results cannot be said to be general in nature.

Our results also have implications for potential CEFs investors. While they neither guarantee alphas nor have time-invariant abilities, our results indicate that discounts are not random noise in the market. Our results point at rational forces being behind discounts. If an investor is interested in trading based on discounts, tracking these factors will yield a deeper understanding of the decision criteria. Bottom line, high discounts do not equal good investment opportunities. In fact, buying highly discounted CEFs will likely see lower abnormal returns.

11. Further Research

Our study has dealt with how CEF firm level characteristics affect the discounts. The most obvious extension to our study is to extend our sample by constructing the NAVs backward in time and including CEFs that have been delisted as of today. A cross-sectional expansion to the neighboring Nordic countries is also a possibility if the structures of the CEF landscapes are similar to the Swedish context.

A somewhat different approach to the subject is to study the activities that the funds themselves may take in order to reduce discounts. We feel that this is relevant as it explores the topic from the point of view of managers, potentially giving them proofs of concept of methods conventionally believed to help reduce discounts, or if they are of no effects. Our study capture these factors using Firm Fixed Effects but cannot sort out the individual effects of any discount reducing mechanisms that may have been employed. Furthermore, qualitative studies for example by interviewing managers could add new perspectives to the topic. Numis Securities for list below actions/areas as possible ways for managers to manage CEF discounts.

Discount Controls	
Supply Side Controls	**Demand Side Controls**
Share Buybacks	Marketing
Tender Offers	Broker Coverage
Regular Redemptions	Enhanced Reporting
Continuation Votes	Corporate Governance
Hybrid LP/CEF Structure	Dividend
Share / Issuance	Fees / Carry Reinvestment
Open-ending	Multi Share Classes
Fixed Life	Put Option
	Alternative Listing

Previous research has covered many of these areas already but from what we have seen, not many have taken closer looks at the micro level of the actions of CEFs, the others factors notwithstanding. Past studies have for example observed how open-ending gets rid of discounts, and how they gradually disappear as funds with fixed life close in to their liquidation dates. What these studies often overlook however is that firms may employ semi-open ending schemes. Melker Schörling AB for example has a yearly redemption program going on where investors may redeem their shares at NAV once a year. Öresund has also offered its shareholders the same option a number of times in the past. These programs are the same as open-ending the funds temporarily which should theoretically wipe out any discounts during the period.

Moving on, Svolder has written in its charter that an annual vote regarding liquidation of the fund, introducing the probability of a fixed life dimension. The discount could therefore go down somewhat in anticipation of the vote and return to normal levels if the liquidation of the fund is not passed.

Buying back shares is another option that CEFs have in their repertoire. Some buy back shares when they feel that the discount is too big. Theoretically, they could then liquidate the treasury shares and distribute them to shareholders at full NAV. In addition to eliminating discounts when distributing the proceedings, buybacks may also serve as good signals to the market. Management willing to act on unreasonably high discounts may be awarded a lower level of discount to begin with.

On the demand side we find additional factors that may affect the discount. Many of these are hard to measure however. Broker coverage is always a good way to spread knowledge about CEFs that can help mitigate discounts. Enhanced reporting is also a very important factor. We have seen firsthand the evolution of CEF reporting formats over the past decade and are positive regarding the direction it has taken with more transparency and standardization.

12. Limitations and Criticism

Even though our method has its foundation in established theories it is far from perfect. While we have included what we believe are the most relevant factors in our explanatory regression specifications, the construction of our variables may a bit too crude for the purpose due to some of their somewhat weak magnitudes. Our regressions yielding results in line with theory however seems support that we are on the right track. Furthermore, while we construct a number of variations of our CAPM alphas, estimating alphas from other pricing models may also be of interest. This is quite an undertaking however and somewhat outside of the scope of this thesis.

Moving on, while it was our aim to provide a robust main regression specification, we are aware that constructing 45 specifications is undesirable. While we could have just run all regressions and presented only those with the best results however, we have chosen to put forth all of our results for the reader to see. This way the weaknesses of regression group 3 for example becomes evident which puts a dent on our main specification in general.

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Appendix A: Tables and graphs

Table 1: Cross Sectional Discount Descriptive Statistics

CEF Discounts	Mean	Standard Deviation	Coefficient of Variation	Skewness	Kurtosis	5th percentile	Median	95th percentile	No. Obs
Bure	0.192	0.173	0.900	1.683	6.359	-0.006	0.155	0.588	2689
Industrivärden	0.246	0.050	0.205	0.944	4.269	0.176	0.238	0.351	3388
Öresund	0.048	0.097	1.999	-0.217	2.355	-0.111	0.044	0.190	3388
Investor	0.304	0.056	0.185	-0.113	2.206	0.211	0.304	0.387	3388
Kinnevik	0.292	0.061	0.207	-0.161	2.336	0.196	0.295	0.387	3110
Latour	0.178	0.091	0.512	0.099	2.413	0.028	0.173	0.333	3388
Lundbergs	0.215	0.055	0.257	0.500	3.568	0.132	0.211	0.317	3388
Ratos	-0.113	0.274	-2.437	0.199	2.009	-0.525	-0.150	0.364	3388
Svolder	0.087	0.089	1.020	-0.306	2.604	-0.066	0.093	0.226	3388
Melker Schörling	0.016	0.045	2.884	-0.742	4.037	-0.062	0.017	0.075	1644
ECE	0.291	0.120	0.411	-0.837	3.509	0.024	0.309	0.466	1329

Table 2: Cross Sectional NAV per share Descriptive Statistics

NAV Returns	Mean	Standard Deviation	Coefficient of Variation	Skewness	Kurtosis	5th percentile	Median	95th percentile	No. Obs
Bure	0.000	0.027	-345.452	-2.635	86.868	-0.028	0.000	0.029	2688
Industrivärden	0.000	0.022	99.439	0.214	8.257	-0.035	0.000	0.034	3387
Öresund	0.001	0.042	36.511	0.196	3.345	-0.065	0.000	0.073	3387
Investor	0.000	0.018	85.274	0.168	7.425	-0.028	0.000	0.028	3387
Kinnevik	0.000	0.023	49.914	0.066	14.062	-0.032	0.000	0.033	3109
Latour	0.000	0.019	45.181	0.223	8.116	-0.029	0.000	0.030	3387
Lundbergs	0.000	0.015	34.032	0.074	8.328	-0.023	0.000	0.023	3387
Ratos	0.000	0.019	57.655	0.204	9.158	-0.028	0.000	0.030	3387
Svolder	0.000	0.019	216.734	-0.160	8.274	-0.030	0.000	0.029	3387
Melker Schörling	0.002	0.048	28.626	0.432	9.686	-0.066	0.000	0.080	1643
ECE	0.000	0.020	-1416.150	0.376	7.507	-0.031	0.000	0.033	1328

Table 3: Cross Sectional Share price Descriptive Statistics

Share Price Returns	Mean	Standard Deviation	Coefficient of Variation	Skewness	Kurtosis	5th percentile	Median	95th percentile	No. Obs
Bure	0.000	0.028	834.726	-2.253	92.161	-0.029	0.000	0.030	2688
Industrivärden	0.000	0.022	73.736	0.430	9.614	-0.034	0.000	0.033	3387
Öresund	0.001	0.042	34.479	0.189	3.279	-0.064	0.000	0.073	3387
Investor	0.000	0.019	67.781	0.111	7.678	-0.030	0.000	0.029	3387
Kinnevik	0.000	0.024	50.997	0.076	14.086	-0.033	0.000	0.033	3109
Latour	0.001	0.019	38.224	0.299	8.586	-0.031	0.000	0.032	3387
Lundbergs	0.001	0.015	28.991	0.055	9.264	-0.023	0.000	0.023	3387
Ratos	0.001	0.019	33.507	0.190	7.505	-0.030	0.000	0.031	3387
Svolder	0.000	0.020	280.243	-0.189	8.655	-0.031	0.000	0.029	3387
Melker Schörling	0.001	0.023	31.839	0.318	10.364	-0.034	0.000	0.035	1643
ECE	0.000	0.022	-73.659	0.417	10.042	-0.036	0.000	0.034	1328

Table 4: Cross Sectional NAV returns Descriptive Statistics

NAV Per Share	Mean	Standard Deviation	Coefficient of Variation	Skewness	Kurtosis	5th percentile	Median	95th percentile	No. Obs
Bure	26.210	17.656	0.674	2.727	11.747	8.632	23.220	41.124	2689
Industrivärden	113.322	32.600	0.288	0.274	2.387	62.737	111.678	174.433	3388
Öresund	90.920	32.477	0.357	0.175	1.833	48.761	92.668	145.592	3388
Investor	171.000	42.572	0.249	-0.544	2.234	89.168	182.505	225.233	3388
Kinnevik	127.885	61.790	0.483	0.138	1.633	36.078	114.301	220.071	3110
Latour	95.103	33.574	0.353	0.325	1.950	48.636	88.056	153.208	3388
Lundbergs	191.342	67.842	0.355	-0.012	1.645	93.503	195.948	292.764	3388
Ratos	49.736	23.929	0.481	0.478	1.711	24.944	44.611	90.851	3388
Svolder	66.016	18.669	0.283	0.321	2.738	36.972	65.564	100.321	3388
Melker Schörling	124.621	39.165	0.314	0.158	2.644	53.460	119.525	189.098	1644
ECE	92.425	11.591	0.125	0.031	1.827	75.251	93.948	110.206	1329

Table 5: Cross Sectional Share returns Descriptive Statistics

Share Price	Mean	Standard Deviation	Coefficient of Variation	Skewness	Kurtosis	5th percentile	Median	95th percentile	No. Obs
Bure	19.801	9.574	0.484	0.875	4.893	6.098	19.626	34.400	2689
Industrivärden	85.226	24.298	0.285	0.218	2.595	46.100	85.250	132.000	3388
Öresund	87.353	34.327	0.393	0.321	2.251	42.159	90.508	149.515	3388
Investor Reported	119.413	31.465	0.263	-0.613	2.715	56.500	127.950	166.000	3388
Kinnevik	89.088	40.093	0.450	-0.024	1.681	23.472	84.750	144.700	3110
Latour	77.874	28.350	0.364	0.437	1.993	40.500	70.125	125.800	3388
Lundbergs	151.457	56.458	0.373	-0.051	1.789	64.500	158.500	237.050	3388
Ratos	58.601	34.984	0.597	0.352	1.722	18.380	56.072	118.100	3388
Svolder	59.722	15.644	0.262	0.057	2.399	32.000	58.750	86.500	3388
Melker Schörling	122.610	38.237	0.312	0.110	2.511	54.250	119.500	186.000	1644
ECE	66.159	16.408	0.248	0.357	2.066	44.000	66.500	96.500	1329

Table 6: Discount Level Pair-wise Correlations

CEF	Bure	Industrivärden	Öresund	Investor	Kinnevik	Latour	Lundbergs	Ratos	Svolder	MSAB	EEC
Bure	1.00										
Industrivärden	-0.32	1.00									
Öresund	-0.14	0.06	1.00								
Investor	0.29	-0.13	0.32	1.00							
Kinnevik	0.39	-0.19	-0.17	0.47	1.00						
Latour	-0.55	0.23	0.36	0.28	0.01	1.00					
Lundbergs	-0.02	-0.19	0.29	0.60	0.33	0.68	1.00				
Ratos	-0.34	-0.28	0.23	0.41	0.23	0.43	0.50	1.00			
Svolder	0.10	-0.37	-0.28	-0.53	-0.12	-0.21	-0.05	-0.29	1.00		
MSAB	-0.74	0.27	0.43	-0.15	-0.20	0.65	0.23	0.29	-0.04	1.00	
EEC	0.06	-0.31	0.30	0.60	0.35	0.50	0.76	0.54	-0.16	0.15	1.00

Table 7: Discount First Difference Pair-wise Correlations

CEF	Bure	Industrivärden	Öresund	Investor	Kinnevik	Latour	Lundbergs	Ratos	Svolder	ECE	MSAB
Bure	1.00										
Industrivärden	0.00	1.00									
Öresund	0.11	-0.09	1.00								
Investor	0.06	0.04	0.14	1.00							
Kinnevik	0.12	-0.10	0.12	0.22	1.00						
Latour	0.02	-0.03	0.17	0.13	0.03	1.00					
Lundbergs	-0.05	0.12	-0.05	-0.06	0.09	-0.03	1.00				
Ratos	-0.03	0.14	-0.13	-0.16	-0.32	-0.16	-0.09	1.00			
Svolder	0.00	-0.13	0.09	0.02	-0.14	0.09	0.09	0.22	1.00		
ECE	-0.01	0.03	-0.02	-0.03	-0.04	0.01	0.00	0.10	0.10	1.00	
MSAB	0.10	-0.12	0.13	0.03	-0.09	-0.02	-0.02	-0.14	-0.06	-0.02	1.00

Main Regression Group 1

Our first group of regressions is organized along the two dimensions of our main research subjects; managerial ability and management fees. Five managerial ability variables, (A) to (E), are constructed by extracting the CAPM alphas for each fund on different rolling bases. These particular setups uses the constants from CAPM regressions using daily returns. Three different management fees variables, (1) to (3) , are used to provide robustness. See section 7 for the construction of the variables. The NAV Dividend Yield is the expected dividends divided with the NAV. The illiquidity ratio is the fraction of capital invested in illiquid assets.

Table 8: CAPM Based on Daily Simple Returns using Management Fees (1)

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	-16.427***	-19.236***	-21.465***	-21.131***	-20.142***
t-stat	(-43.45)	(-40.67)	(-34.45)	(-30.78)	(-25.57)
Management Fees (1)	0.019***	0.020***	0.008***	0.005***	0.011***
t-stat	(10.67)	(10.95)	(4.23)	(2.83)	(5.59)
NAV Dividend Yield	-1.538***	-1.494***	-1.387***	-1.351***	-1.316***
t-stat	(-33.53)	(-32.48)	(-29.97)	(-29.06)	(-28.10)
Illiquidity Ratio	-0.114***	-0.109***	-0.116***	-0.125***	-0.134***
t-stat	(-21.36)	(-20.27)	(-21.39)	(-23.03)	(-24.28)
Constant	0.383***	0.385***	0.382***	0.384***	0.381***
t-stat	(131.47)	(131.73)	(129.93)	(129.47)	(128.11)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.664	0.661	0.657	0.654	0.651
Observations	32388	32388	32388	32388	32388

Table 9: CAPM Based on Daily Returns using Management Fees (2)

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	-15.954***	-19.111***	-21.251***	-20.583***	-19.190***
t-stat	(-39.19)	(-36.58)	(-31.67)	(-28.19)	(-22.28)
Management Fees (2)	0.001	0.000	0.001**	0.002***	0.003***
t-stat	(1.26)	(-0.03)	(2.07)	(3.19)	(4.85)
NAV Dividend Yield	-1.527***	-1.486***	-1.386***	-1.351***	-1.312***
t-stat	(-33.15)	(-32.20)	(-29.93)	(-29.08)	(-28.05)
Illiquidity Ratio	-0.107***	-0.101***	-0.113***	-0.123***	-0.128***
t-stat	(-20.03)	(-18.95)	(-20.96)	(-22.63)	(-23.22)
Constant	0.384***	0.387***	0.382***	0.383***	0.381***
t-stat	(131.33)	(131.16)	(129.43)	(128.75)	(127.12)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.662	0.660	0.656	0.654	0.651
Observations	32488	32488	32488	32488	32488

Table 10: CAPM Based on Daily Simple Returns using Management Fees (3)

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	-15.763***	-18.758***	-22.487***	-22.885***	-23.638***
t-stat	(-41.03)	(-39.02)	(-36.38)	(-34.11)	(-30.27)
Management Fees (3)	-0.012***	-0.017***	-0.025***	-0.031***	-0.033***
t-stat	(-2.94)	(-3.99)	(-5.89)	(-7.20)	(-7.77)
Illiquidity Ratio	-0.081***	-0.075***	-0.085***	-0.094***	-0.103***
t-stat	(-14.46)	(-3.99)	(-14.95)	(-16.63)	(17.90)
Constant	0.354***	-0.075***	0.358***	0.363***	0.363***
t-stat	(121.92)	(-13.23)	(122.19)	(122.36)	(121.44)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.651	0.650	0.648	0.646	0.643
Observations	32388	32388	32388	32388	32388

Main Regression group 2

Our second group of regressions is organized along the two dimensions of our main research subjects; managerial ability and management fees. Five managerial ability variables, (A) to (E), are constructed by extracting the CAPM alphas for each fund on different rolling bases. These particular setups uses the constants from CAPM regressions using 6-month returns. Three different management fees variables, (1) to (3), are used to provide robustness. See section 7 for the construction of the variables. The NAV Dividend Yield is the expected dividends divided with the NAV. The illiquidity ratio is the fraction of capital invested in illiquid assets.

Table 11- CAPM estimated on 6 Month Returns using Management Fees (1)

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	-0.0456***	-0.071***	-0.0667***	-0.1608***	-0.155***
t-stat	(-10.32)	(-13.47)	(-10.96)	(-21.03)	(-17.92)
Management Fees (1)	0.0238***	0.021***	0.019***	0.011***	0.011***
t-stat	(12.65)	(11.42)	(10.04)	(5.8)	(5.88)
NAV Dividend Yield	-1.449***	-1.451***	-1.427***	-1.288***	-1.354***
t-stat	(-30.74)	(-30.84)	(-30.33)	(-27.51)	(-28.8)
Illiquidity Ratio	-0.111***	-0.107***	-0.112***	-0.115***	-0.122***
t-stat	(-20.17)	(-19.3)	(-20.35)	(-20.98)	(-22.24)
Constant	0.371***	0.370***	0.369***	0.350***	0.370***
t-stat	(125)	(125.08)	(124.54)	(92.4)	(125.29)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.6453	0.6461	0.6455	0.6534	0.6476
Observations	32388	32388	32388	31492	32388

Table 12- CAPM Based on 6 Month Returns using Management Fees (2)

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	-0.018***	-0.042***	-0.031***	-0.159***	-19.189***
t-stat	(-3.9)	(-7.28)	(-4.38)	(-17.21)	(-22.28)
Management Fees (2)	0.008***	0.007***	0.008***	0.002***	0.003***
t-stat	(14.57)	(11.98)	(11.87)	(2.8)	(4.85)
NAV Dividend Yield	-1.398***	-1.410***	-1.394***	-1.283***	-1.311***
t-stat	(-29.68)	(-29.94)	(-29.64)	(-27.4)	(-28.05)
Illiquidity Ratio	-0.103***	-0.100***	-0.104***	-0.110***	-0.127***
t-stat	(-18.87)	(-18.28)	(-19.15)	(-20.3)	(-23.22)
Constant	0.369***	0.369***	0.368***	0.350***	0.380***
t-stat	(124.09)	(124.53)	(124.32)	(92.42)	(127.12)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.6457	0.6461	0.6458	0.653	0.6509
Observations	32488	32488	32488	32488	32488

Table 13- CAPM Based on 6 Month Returns using Management Fees (3)

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	-0.031***	-0.062***	-0.072***	-0.177***	-23.637***
t-stat	(-6.97)	(-11.79)	(-11.79)	(-24.17)	(-30.27)
Management Fees (3)	-0.012***	-0.013***	-0.016***	-0.016***	-0.033***
t-stat	(-3)	(-3.06)	(-3.85)	(-3.89)	(-7.77)
Illiquidity Ratio	-0.079***	-0.074***	-0.078***	-0.088***	-0.102***
t-stat	(-13.7)	(-12.92)	(-13.67)	(-15.42)	(-17.9)
Constant	0.344***	0.344***	0.344***	0.327***	0.363***
t-stat	(116.29)	(116.29)	(116.12)	(86.1)	(121.44)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.6336	0.6346	0.6346	0.645	0.6432
Observations	32388	32388	32388	32388	32388

Main Regression group 3

Our second group of regressions is organized along the two dimensions of our main research subjects; managerial ability and management fees. Five managerial ability variables, (A) to (E), are constructed by extracting the CAPM alphas for each fund on different rolling bases. These particular setups uses the constants from CAPM regressions using 12-month returns. Three different management fees variables, (1) to (3), are used to provide robustness. See section 7 for the construction of the variables. The NAV Dividend Yield is the expected dividends divided with the NAV. The illiquidity ratio is the fraction of capital invested in illiquid assets.

Table 14 - CAPM Based on 6 Month Returns using Management Fees (1)

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	0.010***	0.007**	0.009**	0.064***	-0.030***
t-stat	(4.03)	(2.44)	(2.46)	(16.17)	(-6.29)
Management Fees (1)	0.022***	0.022***	0.022***	0.033***	0.020***
t-stat	(11.74)	(11.72)	(11.77)	(17.66)	(10.5)
NAV Dividend Yield	-1.392***	-1.406***	-1.407***	-1.163***	-1.412***
t-stat	(-29.28)	(-29.68)	(-29.71)	(-25.12)	(-29.99)
Illiquidity Ratio	-0.119***	-0.117***	-0.116***	-0.146***	-0.114***
t-stat	(-21.36)	(-21.15)	(-21.09)	(-25.64)	(-20.63)
Constant	0.369***	0.369***	0.369***	0.280***	0.370***
t-stat	(123.93)	(124.34)	(124.28)	(88.56)	(124.53)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.6443	0.6442	0.6442	0.6682	0.6446
Observations	32388	32388	32388	30568	32388

Table 15 - CAPM Based on 6 month Returns using Management Fees (2)

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	0.018***	0.017***	0.022***	0.082***	-0.0134***
t-stat	(6.92)	(5.85)	(6.26)	(19.89)	(-2.66)
Management Fees (2)	0.010***	0.0104***	0.011***	0.014***	0.009***
t-stat	(17.71)	(17.6)	(17.76)	(23.82)	(14.74)
NAV Dividend Yield	-1.334***	-1.353***	-1.353***	-1.131***	-1.385***
t-stat	(-28.18)	(-28.62)	(-28.61)	(-24.54)	-(29.46)
Illiquidity Ratio	-0.109***	-0.107***	-0.106***	-0.124***	-0.105***
t-stat	(-19.97)	(-19.62)	(-19.41)	(-23.11)	(-19.22)
Constant	0.366***	0.367***	0.367***	0.262***	0.368***
t-stat	(123.44)	(124.03)	(123.89)	(82.48)	(124.26)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.6461	0.6459	0.646	0.6705	0.6456
Observations	32488	32488	32488	30668	32488

Table 16 - CAPM Based on 6 Month Returns using Management Fees (3)

CAPM Estimation Window	6 Months	12 Months	24 Months	36 Months	Whole Sample
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	0.021***	0.016***	0.017***	0.044***	-0.040***
t-stat	(8.04)	(5.42)	(5.00)	(11.16)	(-8.37)
Management Fees (3)	-0.018***	-0.017***	-0.016***	-0.009*	-0.015***
t-stat	(-4.13)	(-3.79)	(-3.76)	(-1.93)	(-3.45)
Illiquidity Ratio	-0.087***	-0.084***	-0.083***	-0.109***	-0.081***
t-stat	(-14.99)	(-14.52)	(-14.33)	(-18.95)	(-14.01)
Constant	0.344***	0.345***	0.345***	0.227***	0.344***
t-stat	(116.26)	(116.24)	(116.2)	(81.73)	(116.21)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.6338	0.6334	0.6333	0.6583	0.6339
Observations	32388	32388	32388	30568	32388

Table 17: Robustness Checks

In addition to just switching out our main variables with substitutes we construct five additional specifications. Specification (A) adds a first difference variable based on the managerial ability variable in order to control for long term effects of managerial ability. Specification (B) makes use of a squared variant of our illiquidity ratio in order to capture quadratic effects. Specification (C) uses the natural logarithm of trading volume as a control. Specification (D) drops MSAB from the sample since it may be misrepresentative. Specification (E) looks at the interaction between managerial ability and the illiquidity ratio.

Robustness test description	**First difference alpha**	**Squared Illiquidity**	**Trading Volume**	**Without MSAB**	**Interaction**
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Managerial Ability	-0.070***	-0.059***	-0.074***	-0.071***	0.094***
t-stat	(-13.41)	(-11.11)	(-13.85)	(-13.47)	(9.53)
Managerial ability FD	-0.086				
t-stat	(-1.09)				
Management Fees (2)	0.021***	0.022***	0.020***	0.021***	0.019***
t-stat	(11.44)	(11.63)	(10.60)	(11.42)	(10.03)
NAV Dividend Yield	-1.450***	-1.425***	-1.475***	-1.451***	-1.557***
t-stat	(-30.82)	(-30.39)	(-30.75)	(-30.84)	(-33.07)
Illiquidity Ratio	-0.107***	0.091***	-0.110***	-0.107***	-0.100***
t-stat	(-19.31)	(6.99)	(-19.52)	(-19.30)	(-18.10)
Illiquidity Ratio Squared		-0.221***			
t-stat		(-16.720)			
Trading Volume			-0.005***		
t-stat			(-9.900)		
Interaction (Illiquidity and Managerial Ability)					-0.284***
					(-19.62)
Constant	0.284***	0.369***	0.326***	0.371***	0.368***
t-stat	(87.260)	(125.120)	(61.900)	(125.080)	(124.730)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Adj R-Squared	0.646	0.649	0.649	0.646	0.650
Observations	32381	32388	31116	32388	32388

Table 18: Relationship between discounts and actual future 6-month CAPM abnormal returns

The dependent variables are the actual 6-month abnormal returns of the funds based on CAPM betas and benchmark indices' 6-month returns. The independent variables are the daily cross-sectional and time series discounts of the CEFs. Current discounts are regressed on future actual abnormal returns to test whether they contain information regarding future performance of the CEFs as would be expected given that expectations theory holds.

	6-Month Excess Returns				
CAPM estimation window	**6 Months**	**12 months**	**24 Months**	**36 Months**	**Whole Sample**
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Current Discount	-0.265***	-0.317***	-0.276***	-0.270***	-0.285***
t-stat	(-24.02)	(-29.33)	(-25.90)	(-24.95)	(-26.89)
Constant	0.063***	0.075***	0.042***	0.044***	0.046***
t-stat	(11.77)	(14.20)	(8.00)	(8.32)	(8.84)
Adj R-Squared	0.082	0.081	0.075	0.104	0.079
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Observations	31817	31817	31817	31817	31817

Table 19: Relationship between discounts and actual future 12-month CAPM abnormal returns

The dependent variables are the actual 12-month abnormal returns of the funds based on CAPM betas and benchmark indices' 12-month returns. The independent variables are the daily cross-sectional and time series discounts of the CEFs. Current discounts are regressed on future actual abnormal returns to test whether they contain information regarding future performance of the CEFs as would be expected given that expectations theory holds.

	12-Month Excess Returns				
CAPM estimation window	**6 Months**	**12 months**	**24 Months**	**36 Months**	**Whole Sample**
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**	**Specification (E)**
Current Discount	-0.300***	-0.300***	-0.293***	-0.275***	-0.300***
t-stat	(-18.70)	(-18.78)	(-18.38)	(-17.23)	(-18.88)
Constant	-0.102***	-0.101***	-0.106***	-0.108***	-0.106***
t-stat	(-13.37)	(-13.29)	(-13.98)	(-14.42)	(-13.98)
Adj R-Squared	0.398	0.400	0.401	0.381	0.406
Time Dummies (Yearly)	Yes	Yes	Yes	Yes	Yes
Observations	31421	31421	31421	31421	31421

Table 20: Relationship between discounts and future CAPM alpha (1 Year Lag)

The dependent variables are the 1-year lagged future CAPM alphas estimated on windows (A) and (B) using daily excess returns. Current Discount represents the discount level of a fund today stated in percentages.

CAPM Estimation window	6 Months	12 Months
Coefficient	**Specification (A)**	**Specification (B)**
Current Discount	-0.001***	-0.001***
t-stat	(-17.63)	(-26.09)
Constant	0.001***	0.001***
t-stat	(39.19)	(54.18)
Adj R-Squared	0.0533	0.0898
Observations	29628	29628

Table 21: Relationship between discounts and future CAPM alpha (2 Year Lag)

The dependent variables are the 2-year lagged future CAPM alphas estimated on windows (A) and (C) using daily excess returns. Current Discount represents the discount level of a fund today stated in percentages.

CAPM Estimation window	6 Months	12 Months	24 Months
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**
Current Discount	-0.001***	-0.001***	-0.002***
t-stat	(-6.3)	(-11.87)	(-48.54)
Constant	0.000***	0.001***	0.001***
t-stat	(39.04)	(53.81)	(100.16)
Time Dummies (Yearly)	No	No	No
Adj R-Squared	0.0614	0.1047	0.2523
Observations	26768	26768	26768

Table 22: Relationship between discounts and future CAPM alpha (3 Year Lag)

The dependent variables are the 3-year lagged future CAPM alphas estimated on windows (A) and (D) using daily excess returns. Current Discount represents the discount level of a fund today stated in percentages.

	CAPM 6 Month	CAPM 12 Month	CAPM 24 Month	CAPM 36 Month
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**
Current Discount	-0.001***	-0.002***	-0.001***	-0.002***
t-stat	(-21.03)	(-28.17)	(-26.62)	(-53.83)
Constant	0.001***	0.001***	0.001***	0.001***
t-stat	(51.57)	(67.68)	(92.92)	(129.6)
Time Dummies (Yearly)	No	No	No	No
Adj R-Squared	0.0704	0.1237	0.23	0.3613
Observations	23897	23897	23897	23897

Table 23: Relationship between discounts and future CAPM alpha (1 Year Lag)

The dependent variables are the 1-year lagged future CAPM alphas regressed on windows (A) to (E) and are calculated using 12-month excess returns. Current Discount represents the discount level of a fund today stated in percentages.

CAPM estimation window	6 Months	12 Months
Coefficient	**Specification (A)**	**Specification (B)**
Current Discount	-0.093***	-0.121***
t-stat	(-32.06)	(-37.42)
Constant	0.160***	0.162***
t-stat	(220.94)	(223.12)
Time Dummies (Yearly)	Yes	Yes
Adj R-Squared	0.5127	0.5185
Observations	29628	0.1217

Table 24: Relationship between discounts and future CAPM alpha (2 Year Lag)

The dependent variables are the 2-year lagged future CAPM alphas regressed on windows (A) to (E) and are calculated using 12-month excess returns. Current Discount represents the discount level of a fund today stated in percentages.

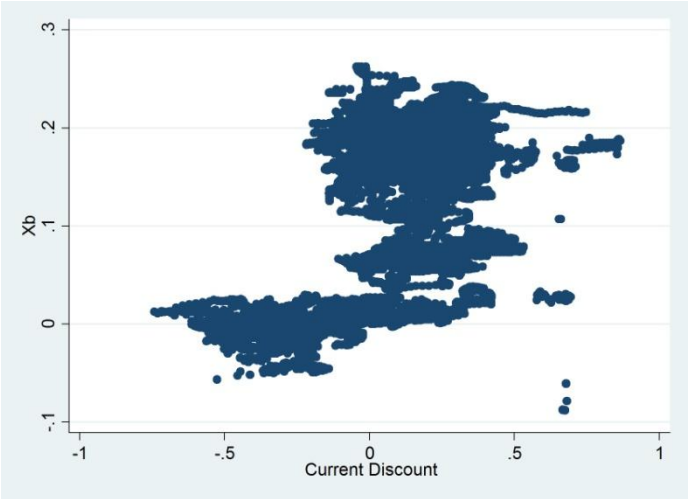
CAPM estimation window	6 Months	12 Months	24 Months
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**
Current Discount	-0.028***	-0.048***	-0.134***
t-stat	(-8.51)	(-12.56)	-27.53
Constant	0.157***	0.159***	0.164***
t-stat	200.60	(200.26)	(202.55)
Time Dummies (Yearly)	Yes	Yes	Yes
Adj R-Squared	0.4716	0.4733	0.4848
Observations	26768	26768	26768

Table 25: Relationship between discounts and future CAPM alpha (3 Year Lag)

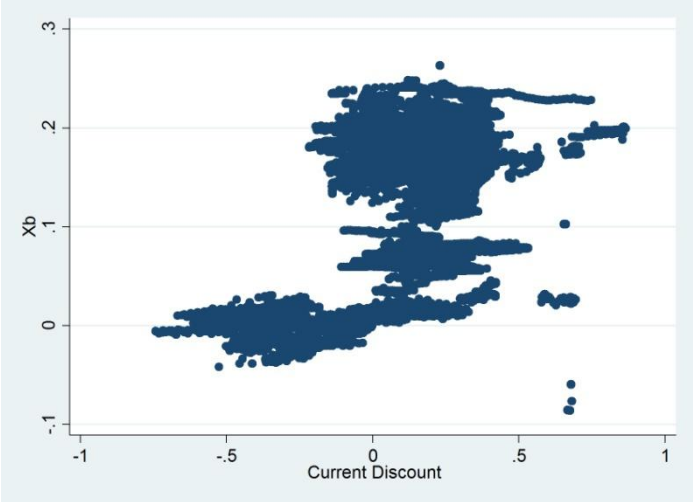
The dependent variables are the 3-year lagged future CAPM alphas estimated on windows (A) to (E) using 12-month excess returns. Current Discount represents the discount level of a fund today stated in percentage points.

CAPM estimation window	6 Months	12 Months	24 Months	36 Months
Coefficient	**Specification (A)**	**Specification (B)**	**Specification (C)**	**Specification (D)**
Current Discount	0.030***	-0.019***	-0.126***	0.091***
t-stat	(8.38)	(-4.55)	(24.46)	(12.47)
Constant	0.156***	0.158***	0.194***	0.151***
t-stat	(190.25)	(191.18)	(194.09)	(162.39)
Time Dummies (Yearly)	Yes	Yes	Yes	Yes
Adj R-Squared	0.440	0.4428	4560	0.4459
Observations	23897	23897	23897	23897

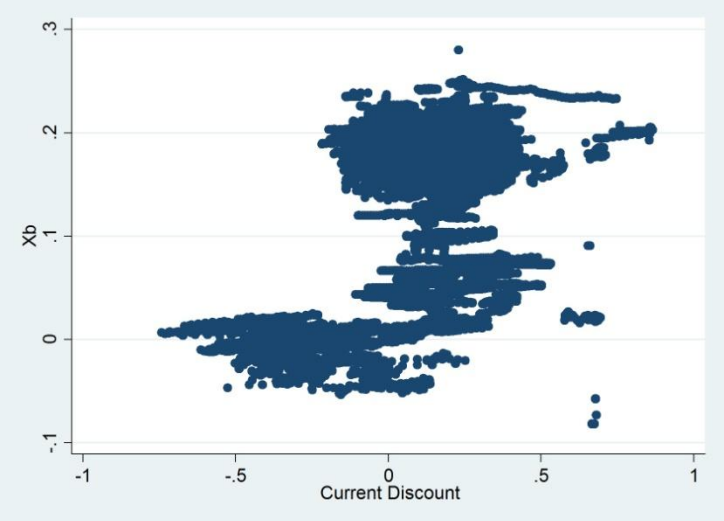
Scatter plot 1 - Regression group 2, specification (A), fitted values on the Y-axis



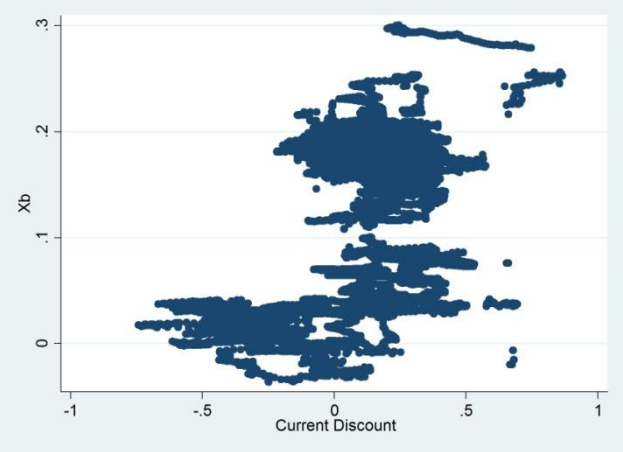
Scatter plot 2 - Regression group 2, specification (B) , fitted values on the Y-axis



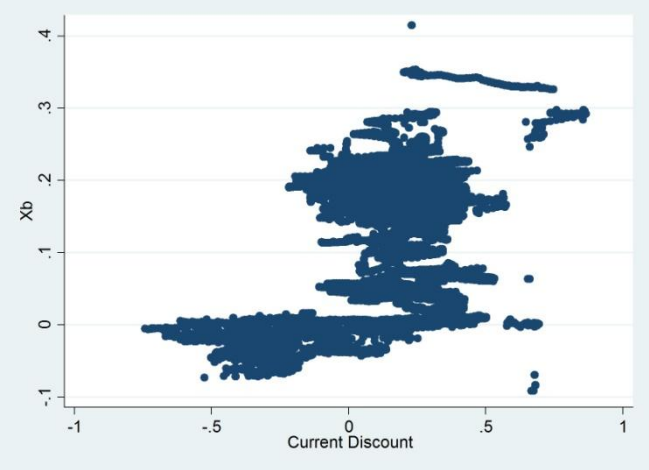
Scatter plot 3 - Regression group 2, specification (C) , fitted values on the Y-axis



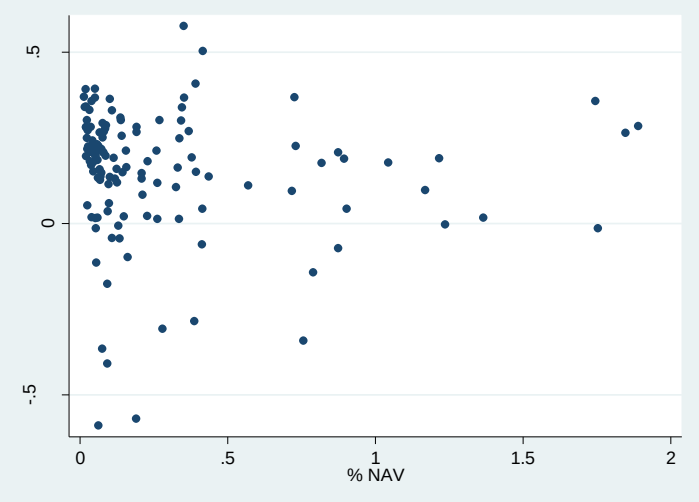
Scatter plot 4 - Regression group 2, specification (D) , fitted values on the Y-axis



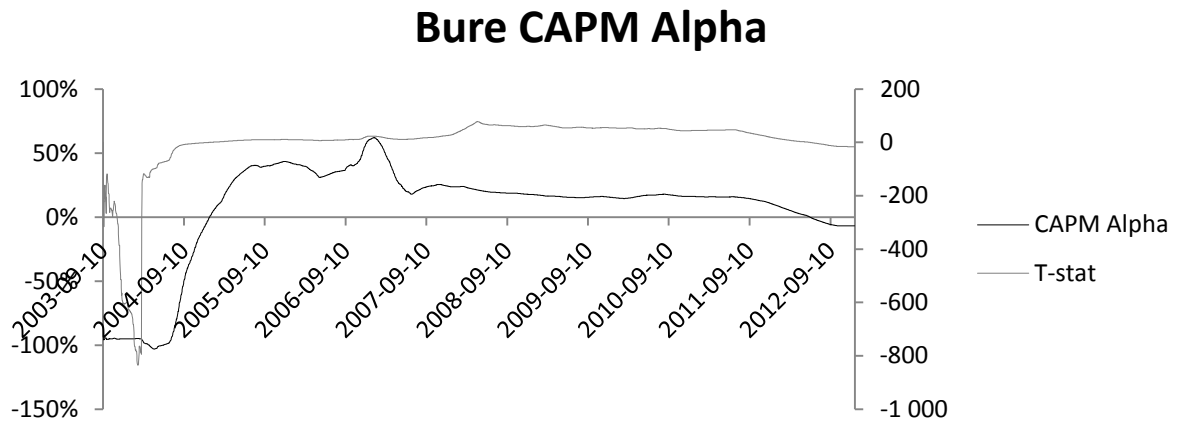
Scatter plot 5 - Regression group 2, specification (E) , fitted values on the Y-axis



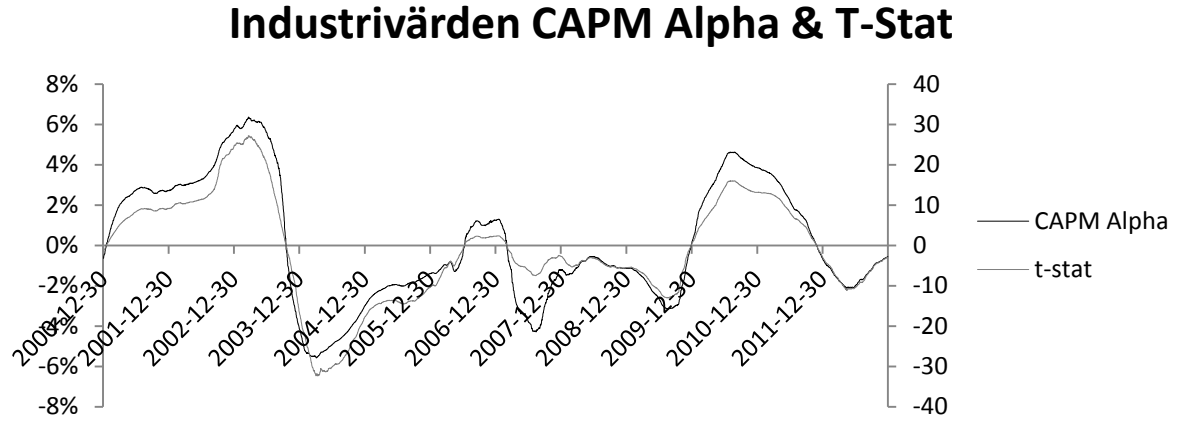
Scatter plot 6 - Scatter between discount levels and PV of actual management fees divided with the NAV



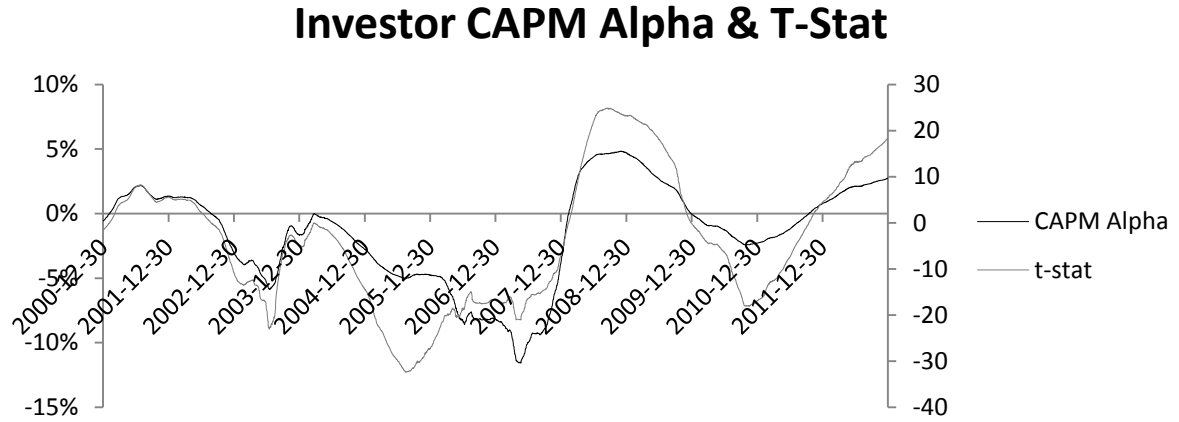
Graph 1 - Bure CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



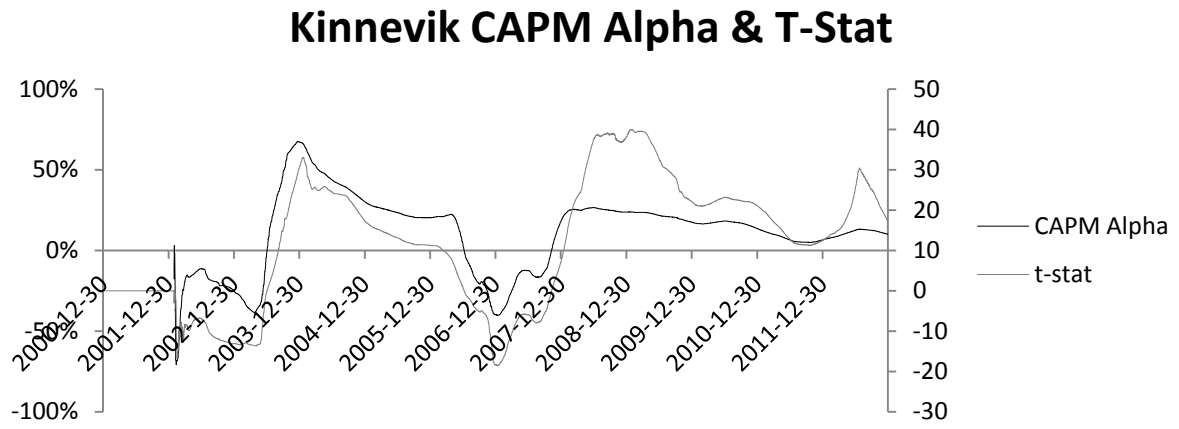
Graph 2 - Industrivärden CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



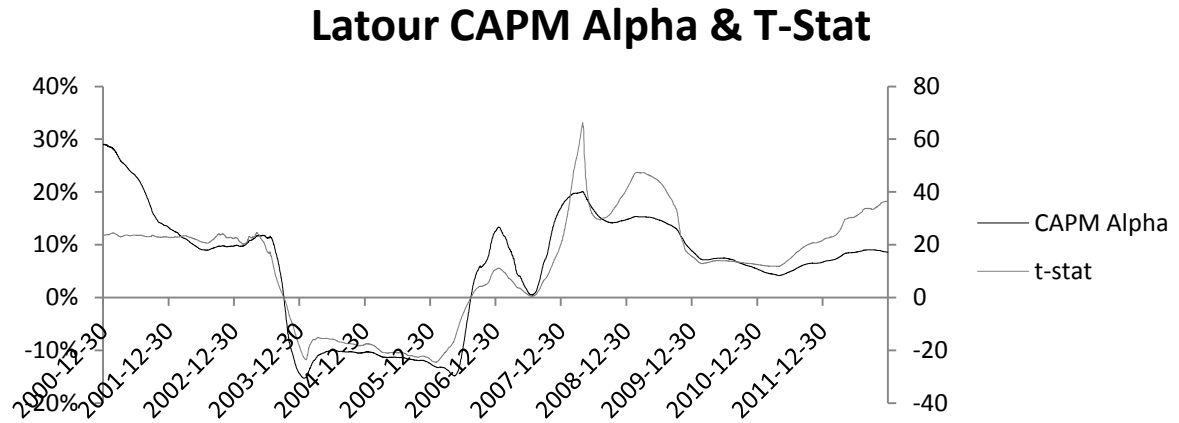
Graph 3 - Investor CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



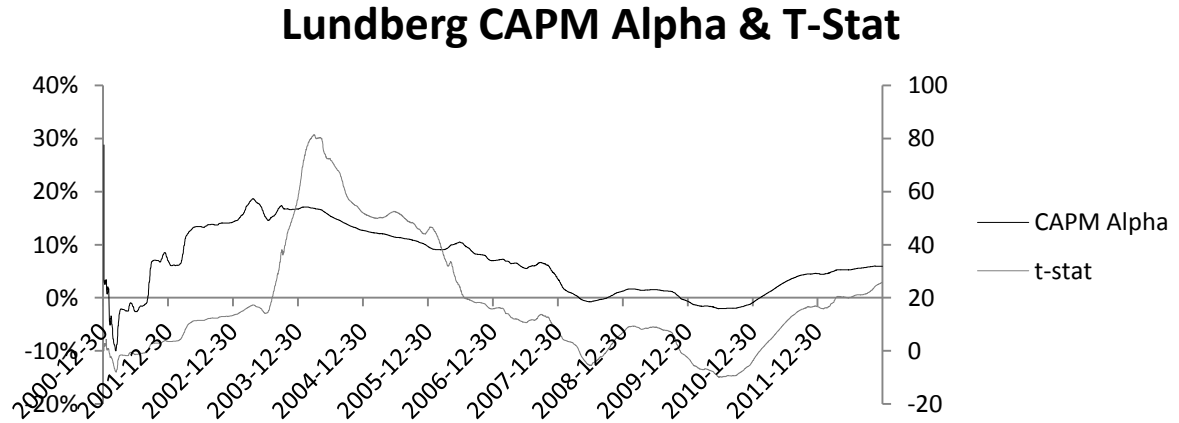
Graph 4 - Kinnevik CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



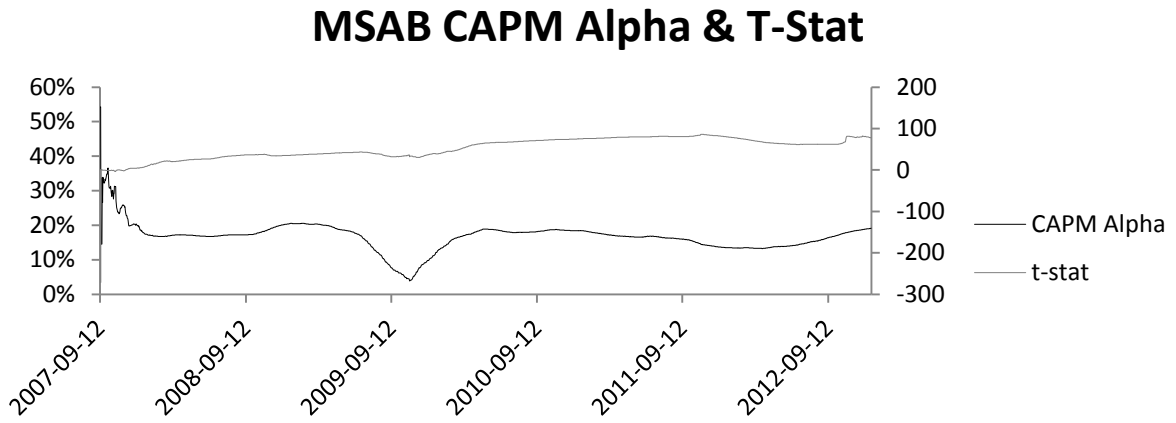
Graph 5: Latour CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



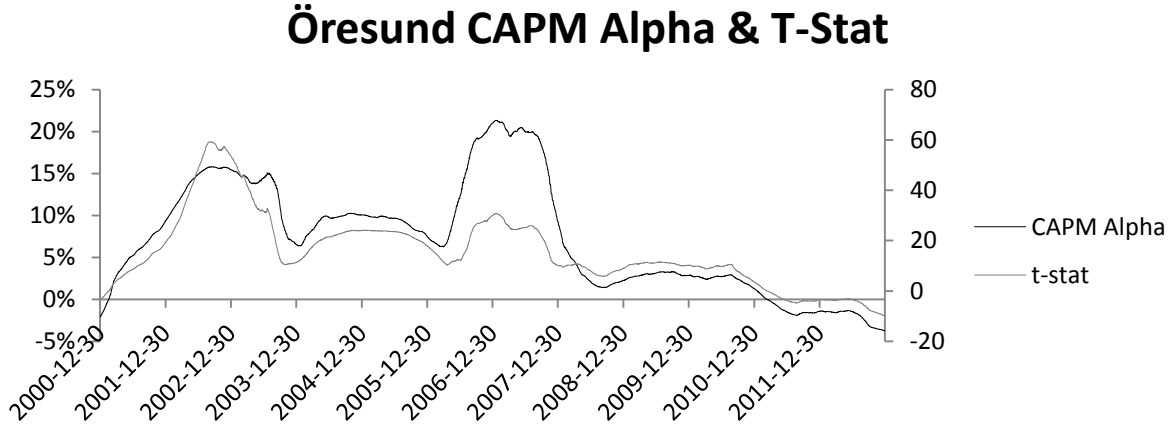
Graph 6 - Lundberg CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



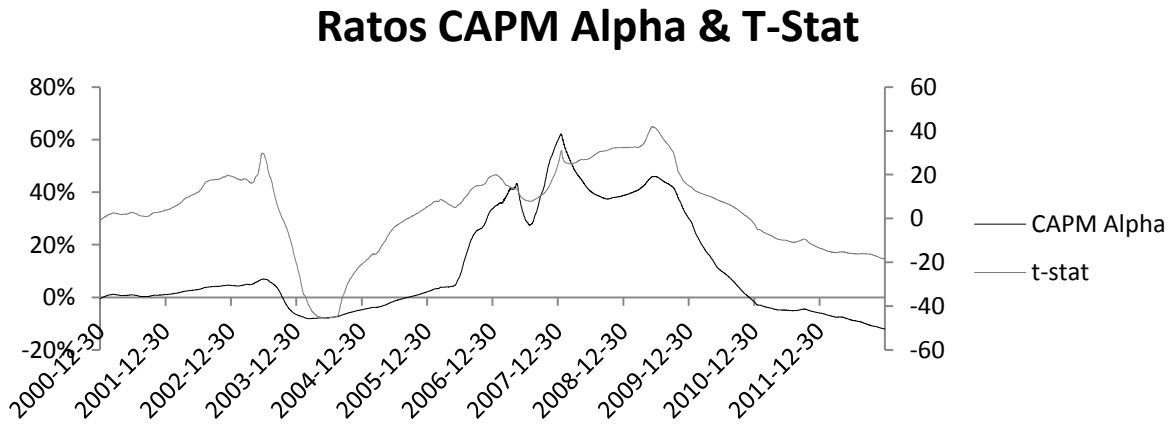
Graph 7 - Melker Schörling AB CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



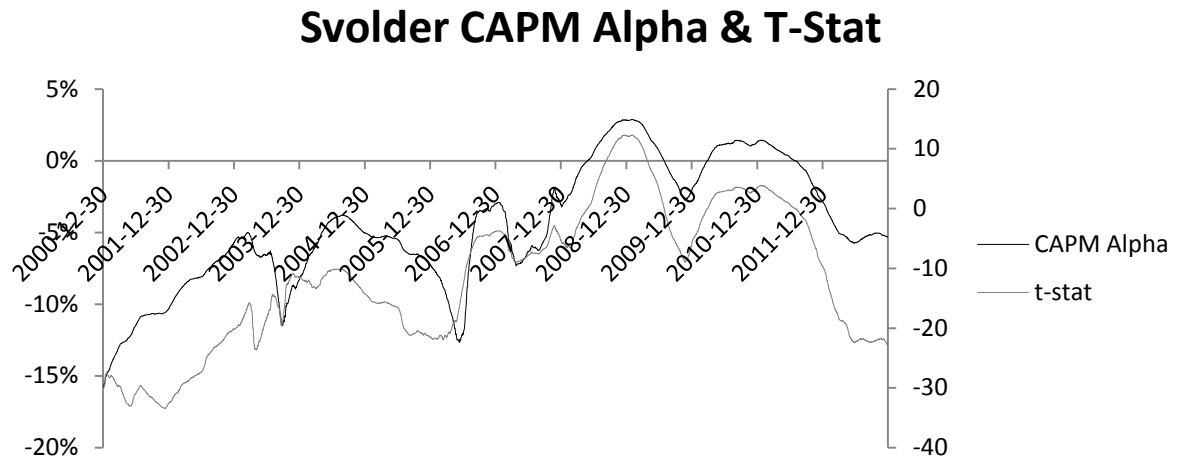
Graph 8 - Öresund CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



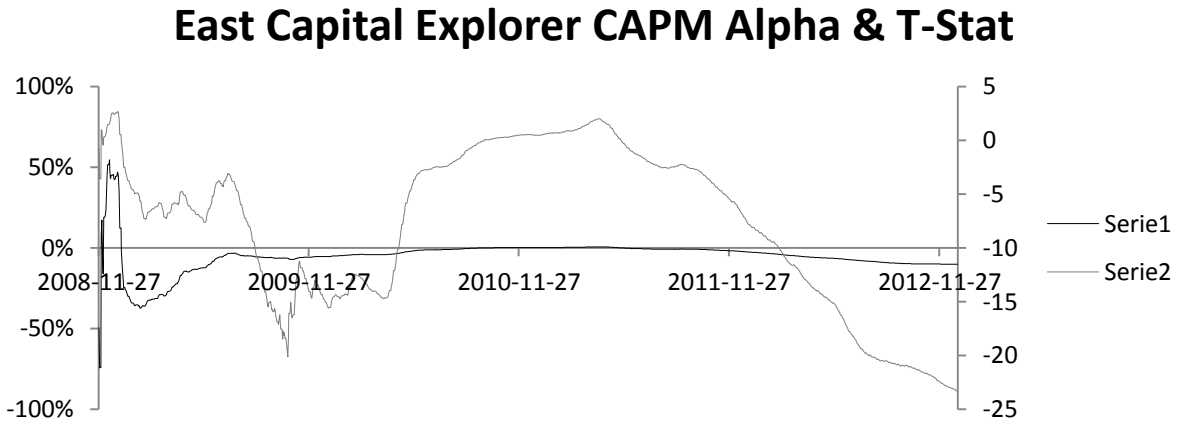
Graph 9 - Ratos CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



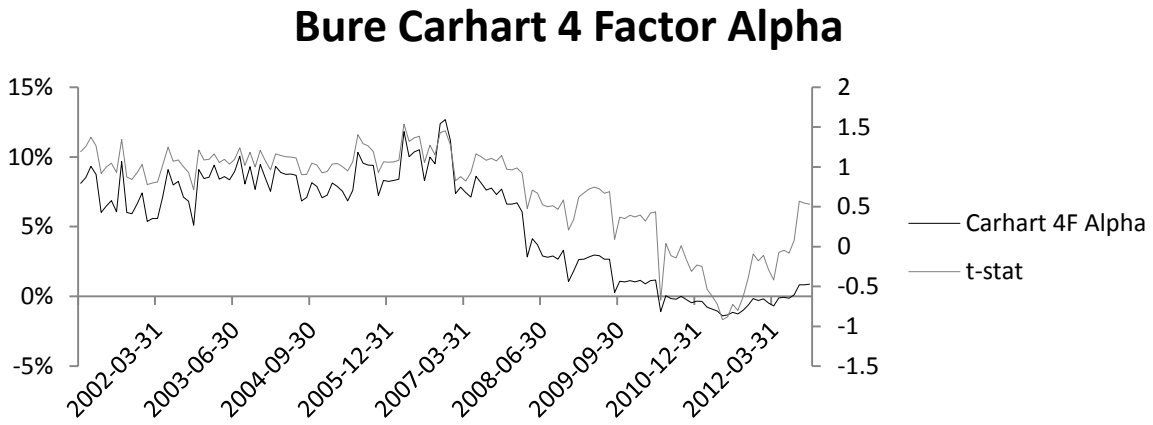
Graph 10 - Svolder CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



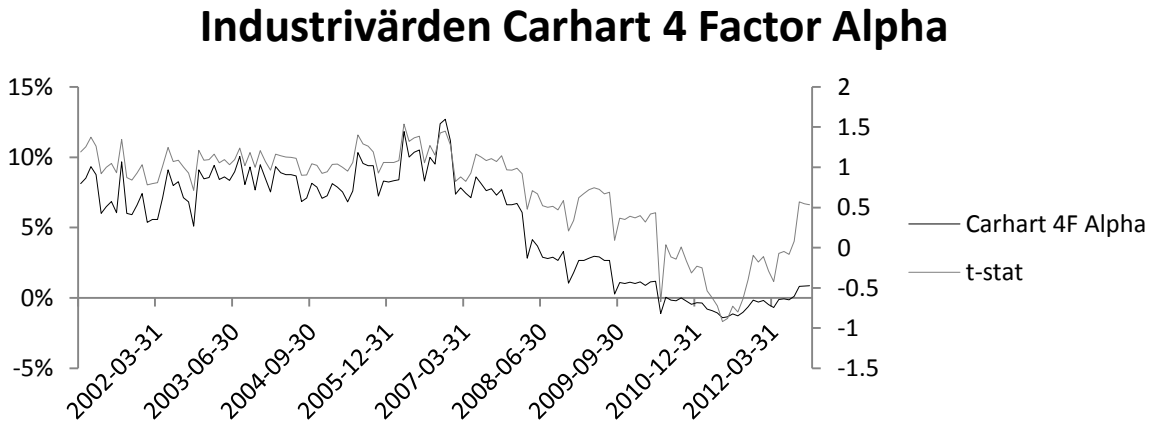
Graph 11 - East Capital Explorer CAPM Alpha and t-stat time series estimated on annual excess returns using a daily rolling window of 36 months



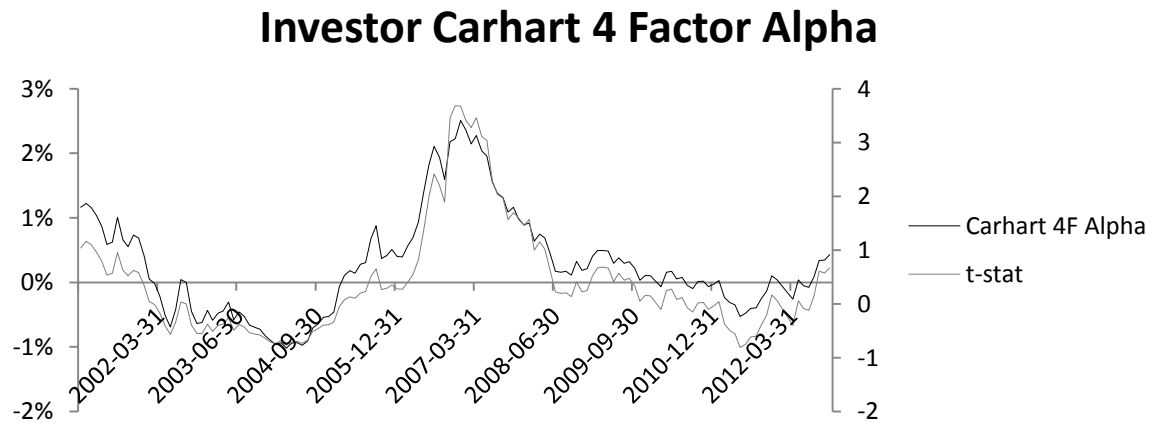
Graph 12 - Bure CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



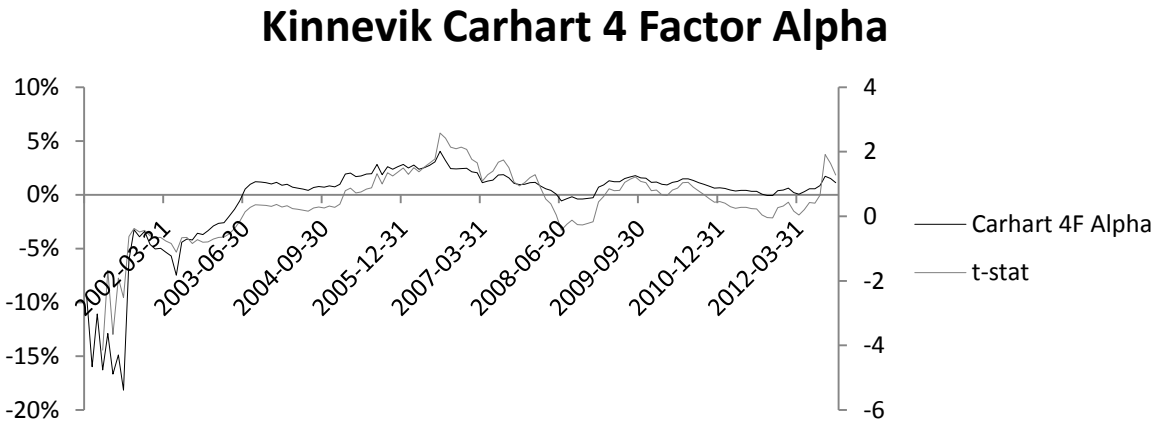
Graph 13 - Industrivärden CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



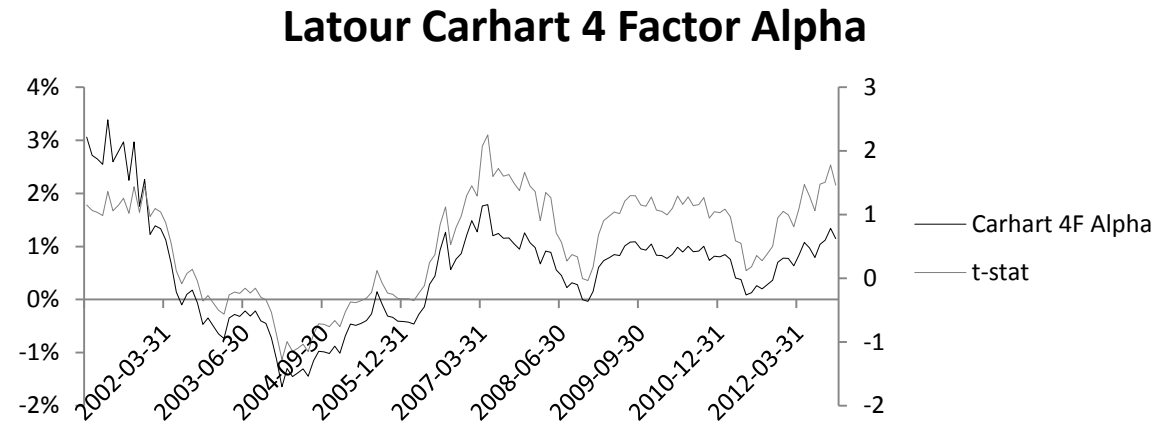
Graph 14 - Investor CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



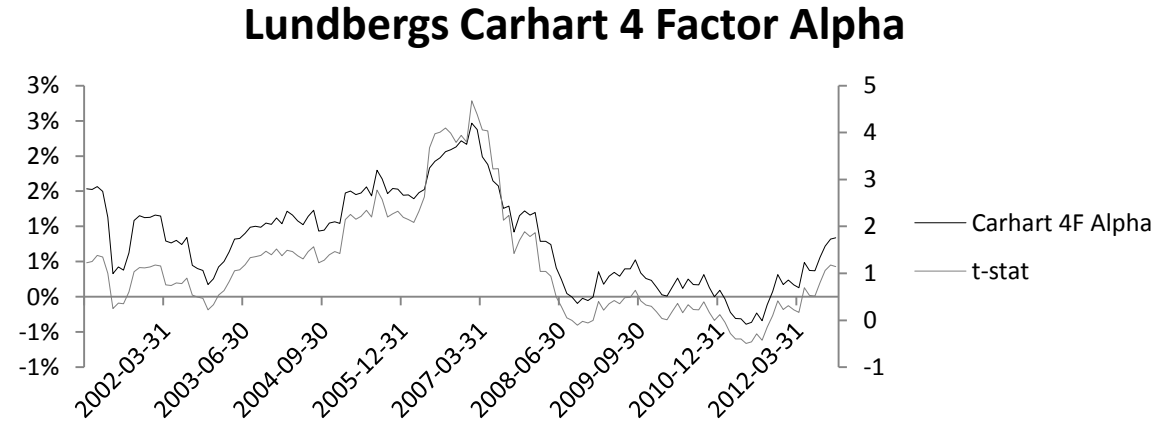
Graph 15 - Kinnevik CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



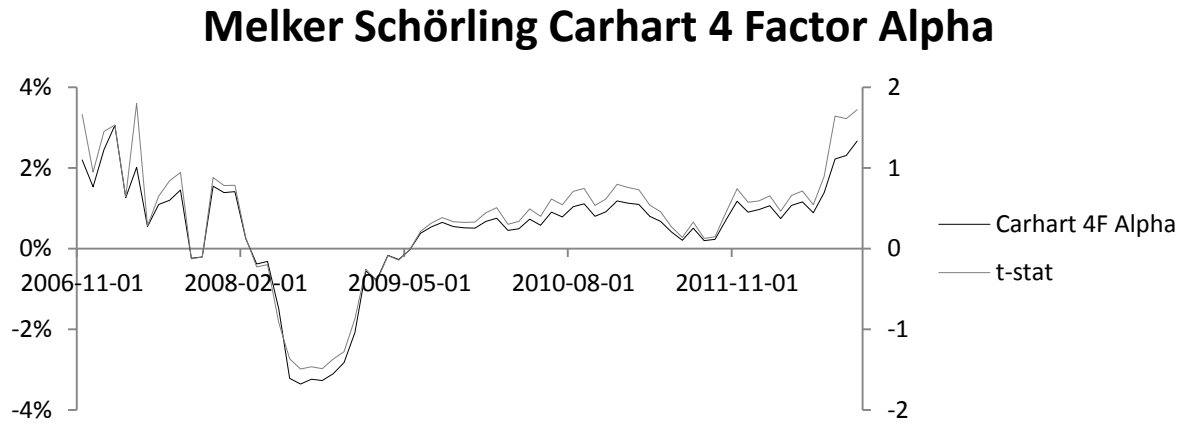
Graph 16 - Latour CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



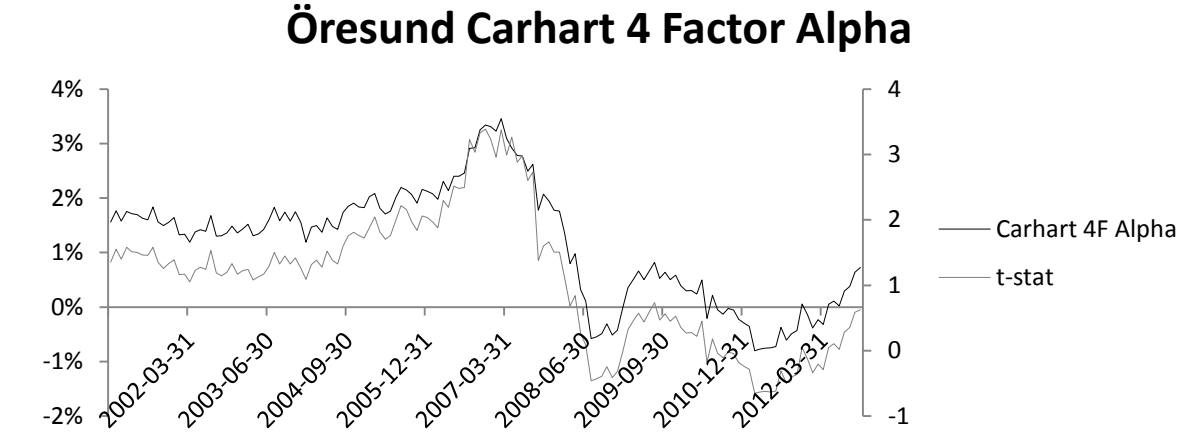
Graph 17 - Lundberg CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



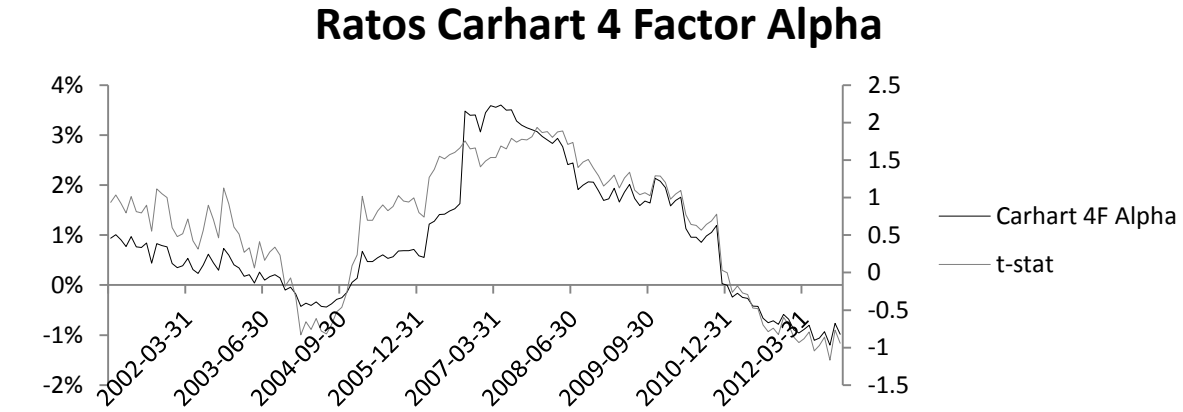
Graph 18 - Melker Schörling AB CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



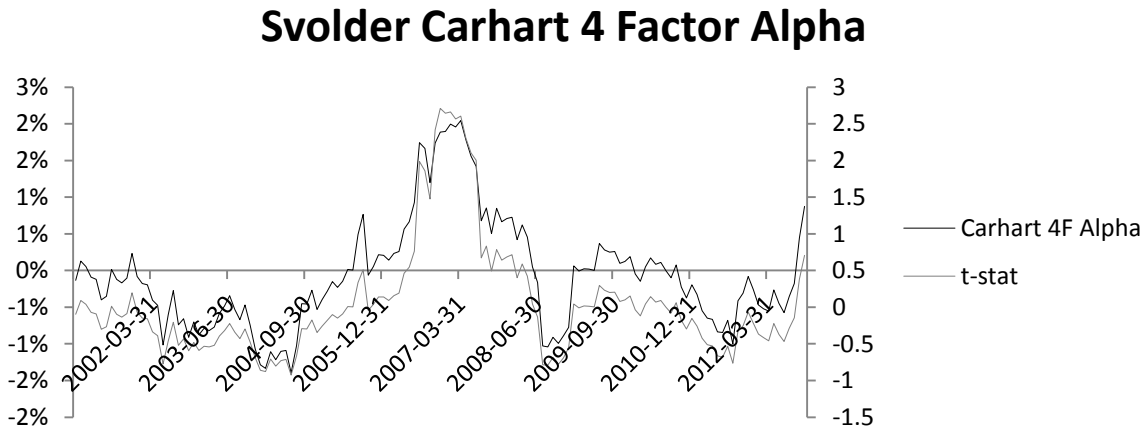
Graph 19 - Öresund CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



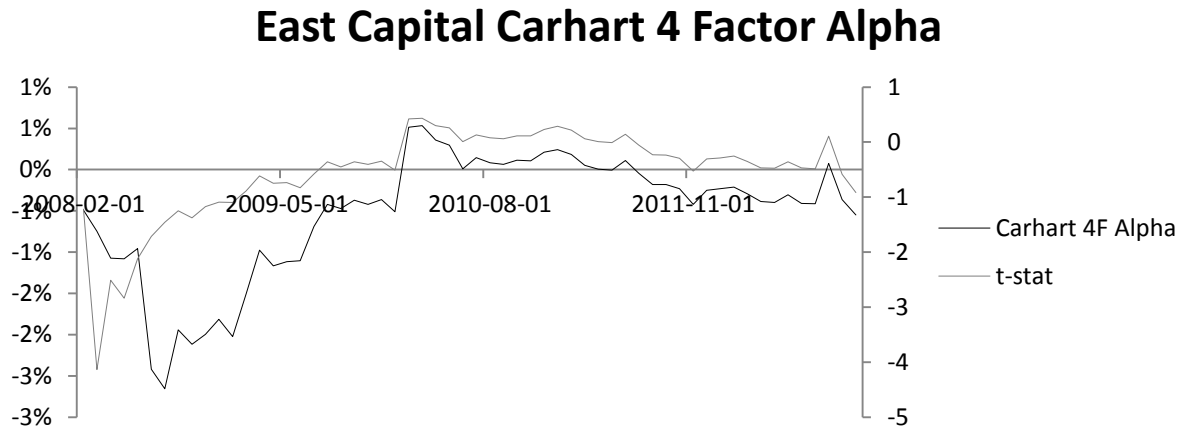
Graph 20 - Ratos CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



Graph 21 - Svolder CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



Graph 22 - East Capital Explorer CF4 Alpha and t-stat time series estimated on monthly excess returns using a monthly rolling window of 48 months



Appendix B - Theoretical Framework and Abnormal Returns

The definition of an efficient and ideal market is that all security prices in the market fully reflect all available fundamental information. The theory was presented as a whole by Fama (1970) and defines three types of market efficiencies; 1) Weak-form, 2) Semi-strong form and 3) Strong form. In the weak-form state all actors use past price developments in order to price securities. Only fundamental information that has not yet been diffused in the market will therefore change price levels significantly. Common tools such as trend analyses and all other aspects of technical analysis are therefore rendered obsolete as any mispricing given past prices will be corrected by the market.

Semi-strong efficiency assumes that the market, in addition to past prices and returns, includes all publicly available fundamental information when valuing securities. The information may range from financial reports and macro variables to structural changes to the markets that firms operate in. A semi-strong efficiency implies that if public information is adequately spread, fund managers and other financial intermediaries investing on behalves of others will not be able to perform better than the market.

The strong-form state of efficiency takes a step further and assumes that pocket groups of investors also have access to inside information and act upon these when they observe inconsistencies on the prices. Should this be the case it is impossible to generate abnormal returns.

CAPM Excess Returns

Our second measure of managerial ability is obtained by the CAPM. Only using normal returns might be misleading as returns may be explained by the fund managers taking on excess risks. By regressing the excess returns of the NAVs onto the market excess returns we receive risk adjusted proxies on the management's skills in the form of the alphas. They represent the funds' performances relative comparable indices and can serve as a measure of skill.

$$CAPM\ NAV\ Returns = \propto + rf + \beta(rm - rf)$$

$$Managerial\ skill = \alpha$$

In addition to extracting the constants we will also perform an F-test in order to check for their joint significance. The market excess return will be defined as the value weighted average returns of the stocks on the Stockholm Stock Exchange minus the Swedish risk free rate. Both series have been downloaded through Thompson Reuter's DataStream.

Carhart's four-factor model

Carhart's four-factor model is an extension of Fama-French's three-factor model with the addition of the momentum factor.

$$CFF\ NAV\ Returns = \propto + rf + \beta(rm - rf) + \beta * SMB + \beta * HML + \beta * MOM$$

$$Managerial\ skill = \alpha$$

The SMB factor is constructed by deducting the returns from the weighted returns of the big portfolios from the small size equivalents.

Size / Book-Market	Small	Big
H	Small / High Book-Market-Value	Big / High Book-Market-Value
M	Medium / High Book-Market-Value	Medium / High Book-Market-Value
L	Small / Low Book-Market-Value	Big / Low Book-Market-Value

Appendix C - Swedish CEF Tax Laws

Definition of an investment company (CEF)

For a company to be defined as an investment company for tax purposes, the requirements are that the company is engaged exclusively or almost exclusively in the management of securities, that the company's stock is spread among a large number of shareholders, and that the portfolio of securities is well distributed.

Intermediaries

Investment companies (CEFs), along with mutual funds, are usually classified as intermediaries. The principles of legislation in this area are:

- that neutrality between direct and indirect ownership requires that the intermediary shall not be subject to taxation,
- that indirect ownership shall not be more advantageous than direct ownership, and
- taxation shall enable reinvestment of the intermediary's shareholding.

Tax Rules

The main principles concerning taxation of investment companies are:

- that interest income is taxable, while interest expenses and management costs are tax deductible,
- that dividends received are taxable, while dividends rendered are tax deductible, and
- that capital gains on sales of stocks are tax exempt, but in return, a standardized level of income, which amounts to 1.5% of the market value of the equities portfolio at the start of the fiscal year, is taxed. The basis for calculating the standardized level of income does not include business-related shares, by which is meant unlisted shares as well as listed shares in which the holding corresponds to at least 10% of the number of votes. In order for listed business-related shares to be excluded from the standardized income calculation, they must have been held for at least one year.