

INVESTMENT COMPANIES AND PREDICTABLE RETURNS

INVESTORS' LIMITED ATTENTION AND LAGGED RETURNS

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Investment Companies and Predictable Returns

Abstract:

This paper investigates investors' limited attention through Swedish investment companies and their respective underlying portfolios. The results indicate that there is no systematic lag in the stock price of investment companies relative to their underlying portfolios, implying that investors are attentive to the information of the underlying portfolio when valuing the investment company. However, a pattern was identified for the indexed returns of the investment company relative to its underlying portfolio during the observed time period. This finding indicates that there is another type of return predictability that investors can exploit, which we have termed *relative return predictability*. Exploiting this observed systematic pattern through a long-short trading strategy yielded a notable return.

Keywords:

Predictable returns, limited attention, investment company, economic links, net asset value discount/premium

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Introduction

Investors react to news and information about companies that may affect the value, or at least the perceived value, that materialize in the stock price. However, many companies are linked to each other in different ways and through different kinds of relationships. In other words, companies are seldomly analyzed in solitariness. Therefore, stock prices react not only to news and information about the own company, but also information related to companies that are economically linked. There are several ways by which companies can be interlinked, e.g. through customer-supplier relationships, or horizontally linked if they operate in the same sector with similar opportunities and risks. A third example is through ownership. The research on the effect of limited attention through ownership linkage is, however, limited compared to other forms of linkage.

This paper thus examines economically linked companies through ownership by investigating the relationship between investment companies and their portfolio companies. More specifically, this paper examines if the returns of the investment company lag the returns of its underlying portfolio as a result of investors' limited attention. The results in our study provide no new evidence of systematic return predictability as a result of investors' limited attention and lagging returns.

An efficient market, as defined by Fama (1970), is a market where all obviously publicly available information is incorporated in the price of the asset. Therefore, investors' limited attention may be seen as a violation of the efficient market hypothesis. Investors' limited attention, defined as the inability of investors to incorporate all obviously publicly available information in the market, is tested by examining how information about the underlying portfolio of the investment company affects the stock price of the investment company. The information affecting the value of the underlying portfolio should be reflected in the stock price movement of the investment company, given that investors are attentive. The value of investment companies should be driven by its holdings. If investors are inattentive, the information about the underlying portfolio may be incorporated with a delay, creating a return predictability in the stock price of the investment company.

With investment companies and real estate companies where there is a market value on the company's assets a net asset value (NAV) discount/premium can be calculated. If the market value of the company is valued lower (higher) than the NAV of its assets, it is traded at a discount (premium). In the study, we will refer to the listed holdings as the investment company's underlying portfolio, given that the unlisted holdings are not updated as frequently, except for in the quarter reports. In addition, the underlying value of unlisted holdings is calculated in different ways, which creates a dimension of uncertainty regarding the valuation, since there is no agreed upon "fair" value on the assets (no market price).

Our main results indicate that there is no systematic lag in the returns of the investment company against its underlying portfolio. Investors seem to be attentive to the available information and incorporate the majority of this information within a week, when valuing the investment company. However, we identified that the returns of the investment company and the underlying portfolio may deviate from time to time, and then eventually coincide, which creates a relative return predictability if the historical pattern is to be repeated in the future. This is true even for investment companies with 100% listed, and therefore only fully observable, assets in their portfolio.

The remaining part of the paper is structured in the following manner: we will give a brief background of existing research in this field of study. Subsequently, we will describe our null

hypothesis and alternative hypothesis and data and methodology. Thereafter, the results and analysis of the appurtenant results will be presented.

I. Background and Literature Review

Limited attention has its foundation in psychological research where, for instance, Kahneman (1973) presented results that attention is a finite resource. It is difficult to process multiple tasks simultaneously. Hence, investors may have a hard time processing and grasping the (publicly) available information because of its magnitude.

A market is efficient when the prices of securities, at any time, fully reflect all available information, according to Fama (1970). This is commonly referred to as the efficient market hypothesis (EMH). Fama (1970) describes and presents three levels of efficient markets. The weak form constitutes that asset prices reflect historical information. The second, semi-strong form implicates that asset prices reflect all historical information and all obviously publicly available information. Third, the strong form of efficient market suggests that asset prices also reflect privately held information. From the point of view of our study, the semi-strong form will be the most relevant, since investors' limited attention has its foundation in that not all publicly available information is reflected in asset prices immediately.

In addition to psychological research and EMH, there is extensive research conducted in the area of limited attention in financial markets. DellaVigna and Pollet (2009) explain that due to investor inattention, earnings announcements on Fridays receive less attention than comparable announcements on other weekdays. As a result, Friday announcements have a 15% lower immediate response and a 70% higher delayed response, creating a predictability in stock price movements. Hong, Lim and Stein (2000) find that firm-specific information, and negative information in particular, travels more slowly across the investing public, indicating that all available information is not directly incorporated in the stock prices.

Regarding economically linked firms, Cohen and Frazzini (2008) illustrate how one can exploit return predictability in stocks that are linked through a customer-supplier relationship. Since the stocks are economically related, the stock price of an important customer and its forecasted future should affect the stock price of the supplier and its forecasted future. However, Cohen and Frazzini (2008) present evidence that because of limited attention, investors do not incorporate this information immediately, which creates a return predictability. Our research stands close to the research of Cohen and Frazzini (2008) by testing limited attention. However, while Cohen and Frazzini (2008) test the economic links through a customer-supplier relationship, we test limited attention through ownership.

Schlag and Zeng (2019) explain that horizontal links between industries also can create a return predictability. Investors that incorporate information and are not limited in their attention can create excessive abnormal returns because of the return predictability in the horizontally linked companies. Menzly and Ozbaz (2010) present evidence of return predictability in economically linked firms in vertical customer-supplier industries. Additionally, the magnitude of the predictability depends on analyst coverage of the company, along with the number of informed investors in the market, which they proxy with the level of institutional ownership in the company. The conclusion of their study was that value-relevant information gradually diffuses in the market.

Barber and Odean (2008) show that investors are net buyers of attention-grabbing stocks, with extreme one-day returns and high trading volume and stocks in the news. Due to investors' attention, they only consider purchasing stocks that has caught their attention. Evidently, a substantial amount of research has been conducted in the field of investors' inattention. However,

it is still interesting to investigate to which extent limited attention is present in the area of investment companies and its underlying portfolio, given the limited amount of research that is conducted in this specific economic link. Additionally, investment companies' value can be primarily derived from its portfolio companies.

There is quite prevalent research of the NAV discount/premium in funds. The NAV discount as explained by Berk and Stanton (2007) in closed-end funds is determined by a trade-off between the managerial ability of finding value creating investments and the contractual compensation to management. If investors believe that management will not find any value creating investments, the fund will be traded at discount. Further, they argue that it is the variation in managerial ability that explains the variation in discounts in funds.

Malkiel (1977) presents different explanations to the NAV discounts in closed-end investment company shares. The closed-end companies imply that no new shares are issued when purchasing shares of the investment company, which differentiates them to mutual funds. Additionally, no shares are redeemed. Therefore, the shares of an investment company are traded at market prices, creating a NAV discount or premium. Malkiel (1977) gives some explanations to why this may occur. First, there is a built-in tax liability arising from the unrealized capital appreciation in the funds, which may justify a discount relative to its NAV. Relating to the tax effects from the capital gains, the distribution policy with respect to the capital gains of the fund may influence the discount/premium. Moreover, the fund may invest in restricted stock, which is often highly illiquid. Since restricted stock is unregistered, the fund may purchase such stock at a discount compared to the unrestricted stocks of the same company, which implies a higher price when/if the fund chooses to liquidate the restricted stock. Holding of foreign stocks might also explain a NAV premium, given that investments in foreign companies are less accessible (or more costly) to some investors.

Furthermore, Malkiel (1977) argues that past performance can explain a discount or premium. If the fund has achieved above-average performance historically, a premium may be justified relative to the NAV. In other words, it may serve as a proxy for future performance. Funds that have a high turnover of investments might trade at a discount given that they pay additional brokerage fees and transaction fees without improving the performance of the fund. Lastly, similar to Berk and Stanton (2007), Malkiel (1977) explains the NAV discount/premium through the size of management compensation. Since there is no evidence that large compensation to management improves the performance of the fund, investment companies that compensates its management generously may be traded at a large discount.

We examine investors' limited attention through investment companies and their underlying portfolios. Even though there is quite a lot of research about investors' limited attention, there is less extensive research conducted about economically linked firms through ownership, which is why we want to examine this and contribute to this field of study.

II. Hypothesis

In this section we describe our hypothesis and the design of our statistical framework. We hypothesize that the presence of attention constraints in financial markets results in stock prices of investment companies not immediately reflecting all publicly available information, which would be the price movements of the investment companies' respective underlying portfolios, generating a predictability of returns in investment companies. Our null hypothesis (H_0) and alternative hypothesis (H_1) are outlined below:

H_0 : Investors are attentive and immediately incorporate all publicly available information of the underlying portfolio when valuing the investment company, implying that there is no lag in the investment company return relative to the return of its underlying portfolio.

H_1 : Due to investors' limited attention, investors do not immediately incorporate all publicly available information of the underlying portfolio when valuing the investment company. This creates a lag in the investment company return, which results in a return predictability of the future stock price development of the investment company.

Financial markets where investors are subject to limited attention should display an inability to immediately collect and gather the required information in order to correctly value the investment company, which in turn would result in a predictability of price movements and returns in the investment company. The appropriate market reaction to a change in the underlying portfolios value would not be reflected immediately in the price of the investment company, but over time drift towards the appropriate reaction as investors have gathered more information of the impact of change on the investment company's NAV.

Our alternative hypothesis implies that the appropriate market reaction in the investment company to a change in value in the underlying portfolio fails to be met in reality. In order to test our hypothesis, we have constructed two different explanatory frameworks that explain how movements in the underlying assets should affect the investment company. This method was chosen to understand which framework best explains how the market reacts to changes in the underlying portfolio, and to determine how and when it deviates from the predicted price movements.

The first theoretical framework put forward to explain the relationship between the investment company's weekly returns and the weekly returns of its underlying portfolio is a portfolio consisting of its listed assets and its net debt. We believe that this creates a good estimate of the investment company's levered returns based on movements in its underlying listed asset value. Furthermore, we have adjusted both components as new information becomes available to the market, for example dividends and transactions. This will be referred to as Framework 1.

The second theoretical framework conceived to explain this relationship is the levered portfolio formula (presented in the coming section under "Data and Method") using the weekly returns of the dividend adjusted underlying portfolio as the unlevered return of the investment company. In contrast to the first framework, this leads to movements in the underlying portfolio being less sensitive to sudden changes in net debt. This is believed to have the benefit of creating a better approximation of the investment company's effect of leverage and market expectations. Net debt is reported quarterly and has been adjusted in-between quarters for items that influence the data. Using dividend adjusted returns of both the underlying portfolio and the investment company has the benefit of removing the effect of dividends on stock prices in the underlying portfolio, that in the second framework theoretically would have led to worse than actual returns in the underlying portfolio and the investment company. This will be referred to as Framework 2.

III. Data and Method

Several sources have been used to obtain the relevant data and information. The study is conducted with eight Swedish investment companies. The investment companies are listed on the Stockholm Stock Exchange and their respective portfolios consist of a mix of both listed and unlisted companies. The listed portfolio companies are mainly listed on Nordic stock exchanges,

but holdings listed on other exchanges also appear in some of the portfolios. The investment company with the lowest average share of listed holdings was Creades, with an average of 63% listed companies in their portfolio during the time-frame of our study. Any investment company with a portion of unlisted holdings lower than this was considered to be too low, given the volume of unobservable information in the underlying portfolio resulting from the larger fraction of unlisted companies. Due to the unobservable nature of unlisted assets, they have been excluded in large parts of the study, except for the calculation of the NAV for the investment companies.

Stock price data and company-specific data was gathered using the database S&P Capital IQ. Data between 2015-11-30 and 2020-12-30 was collected. We collected data from the date of the latest available interim report and chose to have five years in our study to be able to contribute with more robust results. Optimally, a larger data set would have been used. However, given the time constraints of the execution of the study, five years of data was considered to be sufficient. Additionally, the annual reports and interim reports of the investment companies have been used to construct the underlying portfolios in combination with news in-between reports to generate the underlying portfolio and net debt that is known to the public at any given time. News about changes in holdings in the underlying portfolios have been received from online broker and bank Avanza. When the information was made publicly available on Avanza, adjustments to the portfolios have been made to reflect the new information available to investors and market actors. Hence, the underlying portfolios have been adjusted when the interim reports are released (since the underlying portfolios are disclosed in the interim reports), and when news about holdings changes were released, implying that the underlying portfolios have been updated at least on a quarterly basis.

Weekly returns were used as a basis for the study. This time span was used since it allowed for more data points, while avoiding the “noise” of daily data. A consideration also had to be made between weekly or monthly data, where we concluded that, given the research subject of investors’ limited attention on ownership, weekly data was preferred since we expected returns to be reflected within less than a month. This is due to the nature of the information being relatively easy to track. Furthermore, when considering monthly or weekly data, additional data points were preferred for increased robustness of our results.

Swedish regulation requires companies to report to the Swedish supervisory authority, Finansinspektionen, whenever the ownership of a listed company passes any of the threshold levels of 5, 10, 15, 20, 25, 30, 50, 2/3 and 90 percent of the outstanding shares or votes (4 c. 5 § *Lag om handel med finansiella instrument*, SFS 1991:980). This event is announced by the Swedish supervisory authority to increase the transparency of ownership in listed companies. The announcements have been used partly to determine the number of shares certain transactions include, but also to determine changes in the underlying portfolios in general. In addition to this, some companies voluntarily disclosed changes to their portfolios in-between reports through press releases.

Adjustments to net debt has been made in conjunction with the releases of interim reports and when the investment company received dividends from portfolio companies (dividends affect cash levels in the investment company and the value of the underlying asset). However, the debt in the investment companies have been updated quarterly when the interim reports have been released.

Further adjustments between reports also had to be made with regards to transactions. If a purchase (sale) of shares occurred in-between reports, an adjustment to net debt was made by decreasing (increasing) cash reserves with an amount equal to the number of shares purchased multiplied by the share price at that time. However, an important factor worth mentioning is that

the investment companies may execute the transactions at a different price than the stock price at that point in time. This is because investment companies often are significant shareholders in their portfolio companies and might have to sell (purchase) at discount due to the sheer amount of stock, which makes the assets less liquid. This implies that we might systematically overestimate the transaction value when making these adjustments to net debt. Since we made the adjustments based on the market prices and not the “actual” transaction price, this may be a source of error. This error is, however, corrected quarterly with the release of new financial reports.

Additionally, some of the holdings in the underlying portfolios include companies with different stock classes. If a holding consists of one stock that is listed on a stock exchange and another that is unlisted, we have included the unlisted shares as listed, since the underlying company is the same. This rests on the assumption that the price movements of different stock classes move together. This means that the premium for increased voting rights that these shares often include has been disregarded, as well as the liquidity premium that listed shares have compared to unlisted shares.

Furthermore, both the market capitalization and the dividend adjusted market capitalization have been used for the investment companies and the portfolio companies in order to investigate which framework best replicates the observed outcome of returns.

The return of the listed assets less net debt (Framework 1) and the levered portfolio formula (Framework 2) that have been applied in this study, and were introduced in section II., consist of the following:

Framework 1: Return of Listed Assets Less Net Debt

$$R_{iF1,t} = \frac{U_t - ND_t}{U_{t-1} - ND_{t-1}}$$

$R_{iF1,t}$ = Expected return of the investment company at time t following Framework 1

U_t = Value of the underlying listed assets at time t

ND_t = Net debt at time t

Framework 2: Levered Portfolio Formula

$$R_{iF2,t} = R_{u,t} + \left(\frac{ND_t}{E_t} \right) * (R_{u,t} - R_{nd,t})$$

$R_{iF2,t}$ = Expected return of the investment company at time t following Framework 2

$R_{u,t}$ = Actual return in the underlying listed portfolio at time t

ND_t = Net debt at time t

E_t = Value of listed underlying portfolio less net debt at time t

$R_{nd,t}$ = Cost of net debt at time t equals the risk-free rate at time t plus the credit risk premium at time t

Credit ratings made by credit rating institutions were used to proxy the cost of net debt in the investment companies. In companies that had not received a credit rating we used the Damodaran (2000) table to retrieve an estimated credit risk premium, and hence the cost of net debt, for these companies. Aswath Damodaran is a professor at Stern School of Business at NYU, who has created a tool to estimate the credit risk for companies that do not have a credit rating. The credit risk

premium is calculated by retrieving the interest coverage ratio, defined as earnings before interest and taxes plus the financial income divided by the financial expenses, for each individual company and then matching it with the Damodaran table to receive the appropriate credit risk premium. The risk-free rate used in the calculation of cost of net debt was retrieved from a study conducted annually by PricewaterhouseCoopers Sweden (2020), which examined the most common risk-free rate used in discounting models in the financial industry today in Sweden. This was considered more appropriate than using government bonds as the risk-free rate, given the current economic situation with exceptionally low interest rates. We instead opted to choose what the industry uses to estimate the cost of leverage.

IV. Results

Below, the main results in the study are outlined. Table I shows the calculated correlations between the weekly returns of the investment company and its underlying portfolio through Framework 1 and Framework 2. Not surprisingly, the underlying portfolio's price movements correlate well with the investment company's price movements. However, to which degree the underlying and the investment company correlate, seem to have little to no immediate connection to the average percentage of unlisted holdings during the observed five-year period.

Table I
Correlation Between the Underlying Portfolio and the Returns of the Investment Company

Pearson rank correlation coefficients have been calculated on a weekly basis of the underlying listed portfolios of the eight investment companies in our study. *Framework 1* shows how the returns of the underlying listed portfolio less net debt correlates with the returns of the investment company. *Framework 2* shows how well the dividend adjusted listed portfolio's returns correlates with the dividend adjusted returns of the investment company. The two frameworks are explained in detail in section II. % *Listed* shows the average percentage of listed assets in the investment company's underlying portfolio. 5% statistical significance is indicated by *, 1% statistical significance is indicated by ** and 0.1% statistical significance is indicated by ***.

		Framework 1		Framework 2	
	% Listed	Correlation	T-value	Correlation	T-value
Bure	89%	0.692***	15.198	0.692***	15.228
Creades	63%	0.244***	4.0423	0.309***	5.201
Industrivärden	100%	0.789***	20.471	0.814***	22.295
Investor	77%	0.800***	21.328	0.832***	24.041
Kinnevik	85%	0.701***	15.676	0.723***	16.679
Latour	71%	0.624***	12.681	0.646***	13.438
Lundberg	81%	0.737***	17.314	0.745***	17.713
Svolder	100%	0.777***	19.827	0.750***	18.183

Table II presents the results from regression analysis when testing to which extent the returns in the underlying portfolio explains the returns of the investment company. Three different time periods were used in the tests to measure if there was a delay in the flow of information or how quickly investors incorporate the information of the underlying portfolio when valuing the investment company. That is, we explore the lag in the investment company return up to two weeks.

Table II
Regression Tests of Investment Companies and Their Respective Underlying Portfolios

This table shows how the underlying portfolio weekly returns, calculated through the different explanatory frameworks, predict the weekly returns of the investment company. *Framework 1* is the first framework tested and shows to which extent the returns in the investment company are explained by its underlying listed assets less net debt. *Framework 2* is the second framework tested and shows to which extent the dividend adjusted weekly returns (with the levered portfolio formula), explains the dividend adjusted weekly returns of the investment company. The two frameworks are explained in detail in section II. Beneath the respective investment companies' labels, the explanatory variables *Underlying (t)*, *Underlying (t-1)*, *Underlying (t-2)* are presented. These represent how the lagged portfolio returns with a lag of 0 (*t*), 1 (*t-1*) and 2 (*t-2*) weeks, predict the returns in the investment company at time (*t*). % *Listed* shows the average percentage of listed assets in the investment company's underlying portfolio. Negative values are presented in parenthesis. 5% statistical significance is indicated by *, 1% statistical significance is indicated by ** and 0.1% statistical significance is indicated by ***.

		Framework 1			Framework 2		
	% Listed	Coefficient	R ²	T-statistic	Coefficient	R ²	T-statistic
Bure	89%		0.483			0.484	
Underlying (t)		0.889***		15.008	0.897***		15.024
Underlying (t-1)		0.011		0.193	(0.003)		(0.046)
Underlying (t-2)		(0.018)		(0.306)	(0.008)		(0.143)
Creades	63%		0.066			0.110	
Underlying (t)		0.290***		3.954	0.334***		5.070
Underlying (t-1)		0.018		0.244	0.075		1.131
Underlying (t-2)		(0.097)		(1.312)	(0.120)		(1.806)
Industrivärden	100%		0.628			0.668	
Underlying (t)		0.805***		20.430	0.830***		22.302
Underlying (t-1)		0.037		0.954	0.039		1.065
Underlying (t-2)		0.106**		2.723	0.108**		2.946
Investor	77%		0.637			0.694	
Underlying (t)		0.816***		20.878	0.874***		23.745
Underlying (t-1)		0.009		0.221	0.002		0.043
Underlying (t-2)		(0.030)		(0.789)	(0.052)		(1.433)

Table II ~ Continued
Regression Tests of Investment Companies and Their Respective Underlying Portfolios

Framework 1				Framework 2				
	% Listed	Coefficient	R ²	T-statistic		Coefficient	R ²	T-statistic
Kinnevik	85%		0.496				0.521	
Underlying (t)		0.748***		15.463		0.793***		16.298
Underlying (t-1)		0.046		0.938		0.010		0.206
Underlying (t-2)		0.106*		2.218		0.081		1.674
Latour	71%		0.404				0.450	
Underlying (t)		0.762***		12.719		0.827***		13.807
Underlying (t-1)		0.122*		(2.044)		(0.153)*		(2.575)
Underlying (t-2)		0.049		0.815		0.059		0.983
Lundberg	81%		0.562				0.573	
Underlying (t)		0.681***		16.968		0.732***		17.155
Underlying (t-1)		(0.125)**		(3.101)		(0.148)***		(3.441)
Underlying (t-2)		0.008		0.190		(0.003)		(0.067)
Svolder	100%		0.612				0.527	
Underlying (t)		1.058***		19.641		0.830***		16.521
Underlying (t-1)		0.036		0.659		0.035		0.704
Underlying (t-2)		(0.015)		(0.287)		(0.012)		(0.253)

There seems to be no immediate connection between the average percentage of listed holdings in the underlying portfolio and the R^2 value. For example, the returns in Investor, with an average of 77% listed holdings in the underlying portfolio, had a higher coefficient and R^2 value than Industrivärden, with an average of 100% listed holdings in the underlying portfolio, in both explanatory frameworks. Two of the eight investment companies (Industrivärden and Svolder) had 100% listed holdings in the underlying portfolio during the time frame of our research. If the percentage of listed holdings in the underlying portfolio alone would have an explanatory effect on the returns observed in the investment company relative to the returns in the underlying listed portfolio, it would become clear in the regression analyses of Svolder and Industrivärden. Evidently, there is no direct and clear connection.

Studying Table II, it is evident that a majority of the returns in the investment company can be explained by the returns in the underlying portfolio the same week. That is, the results from Table II hint that investors incorporate most of the information during the same week, without a delay, and that there is no systematic delay in incorporating information.

However, in Industrivärden, with 100% listed assets, the returns of the underlying portfolio with a two-week lag predicts the returns of Industrivärden to a greater extent than the returns with a one-week lag. This is interesting since the underlying portfolio of Industrivärden is fully observable, due to the absence of unlisted holdings. Another noteworthy observation in Table II is the negative coefficient in Lundberg, observed both in Framework 1 and Framework 2. This could be interpreted as a “reverse” predictability in Lundberg’s returns relative to that of its underlying portfolio. That is, Lundberg seems to move in the opposite direction to its underlying portfolio with a one-week lag.

When studying the other investment companies, however, the results are more ambiguous. There is no clear systematic lag in the returns of the investment companies, indicating that investors are attentive to information about the underlying portfolio when valuing the investment

company. We cannot fully determine a systematic lag in the observed investment companies, given the results presented in Table II.

Regarding the different explanatory frameworks, Framework 2 explains and predicts the returns in the investment companies' returns better in all observed companies except for Svolder. In other words, the levered portfolio formula seems to explain the returns of the investment companies slightly better compared to when net debt is taken into consideration directly.

Even though there may not be a systematic lag in the investment company returns, the investment companies' returns follow the return of their corresponding underlying portfolio well during the time frame of the study as shown in figure I-VI. However, there are periods where the two deviate from each other, and eventually re-align, suggesting that there might be some predictability in how the two will move in relation to each other in the near future, which we have termed *predictable relative returns*. Due to the non-systematic lag in the investment company return, the returns in the investment company may not be predictable from this perspective. However, the deviation from the historical return pattern might be possible to exploit, and in turn yield a predictable return.

Figures I-VI display the indexed returns of Industrivärden, Svolder, and Investor, and their respective underlying portfolios. Figure I, III, and V plot the indexed returns of the unadjusted market capitalization and the indexed returns of the underlying portfolio calculated through Framework 1. Figure II, IV, and VI plot the returns of the indexed dividend adjusted returns of market capitalization and the indexed returns of the underlying portfolio calculated through Framework II.

Figure I
Returns of Industrivärden and the Underlying Portfolio (Framework 1)

This figure plots the accumulated returns of the investment company (Industrivärden, in black) and the accumulated returns of the underlying portfolio (in blue), calculated through Framework 1. The returns of Industrivärden are the market capitalization returns. The graph plots the returns between 2015-12-31 and 2020-12-31. The returns are indexed to 1.00 as of 2015-12-31.

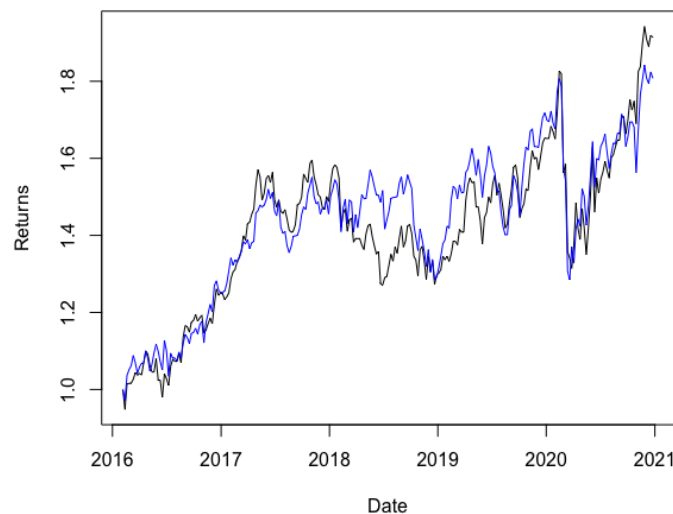


Figure II
Returns of Industrivärden and the Underlying Portfolio (Framework 2)

This figure plots the accumulated dividend adjusted returns of the investment company (Industrivärden, in black) and the accumulated dividend adjusted returns of the underlying portfolio (in yellow), calculated through Framework 2. The returns of Industrivärden are the dividend adjusted market capitalization returns. The graph plots the returns between 2015-12-31 and 2020-12-31. The returns are indexed to 1.00 as of 2015-12-31.

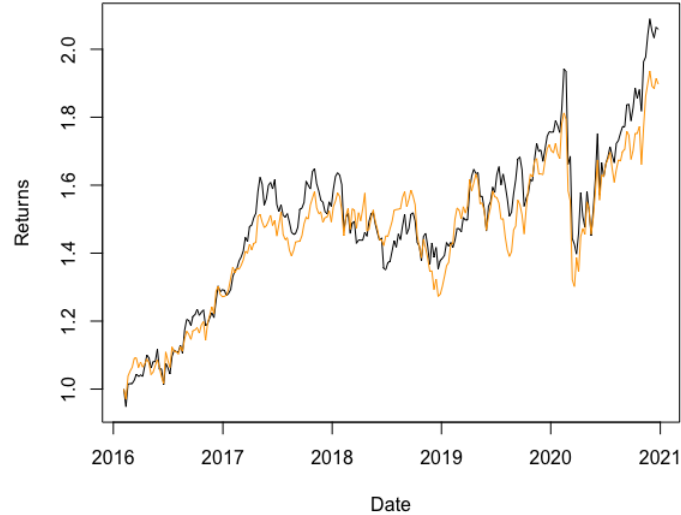


Figure III
Returns of Svolder and the Underlying Portfolio (Framework 1)

This figure plots the accumulated returns of the investment company (Svolder, in black) and the accumulated returns of the underlying portfolio (in blue), calculated through Framework 1. The returns of Svolder are the market capitalization returns. The graph plots the returns between 2015-11-30 and 2020-11-30. The returns are indexed to 1.00 as of 2015-11-30.

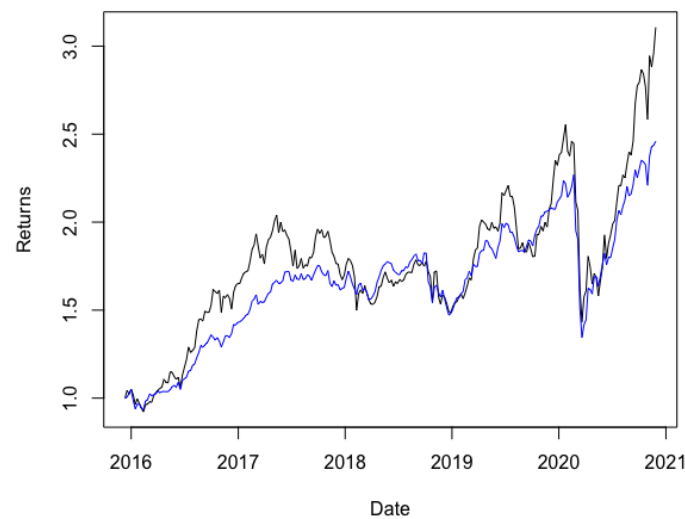


Figure IV
Returns of Svolder and the Underlying Portfolio (Framework 2)

This figure plots the accumulated dividend adjusted returns of the investment company (Svolder, in black) and the accumulated dividend adjusted returns of the underlying portfolio (in yellow), calculated through Framework 2. The returns of Svolder are the dividend adjusted market capitalization returns. The graph plots the returns between 2015-11-30 and 2020-11-30. The returns are indexed to 1.00 as of 2015-11-30.

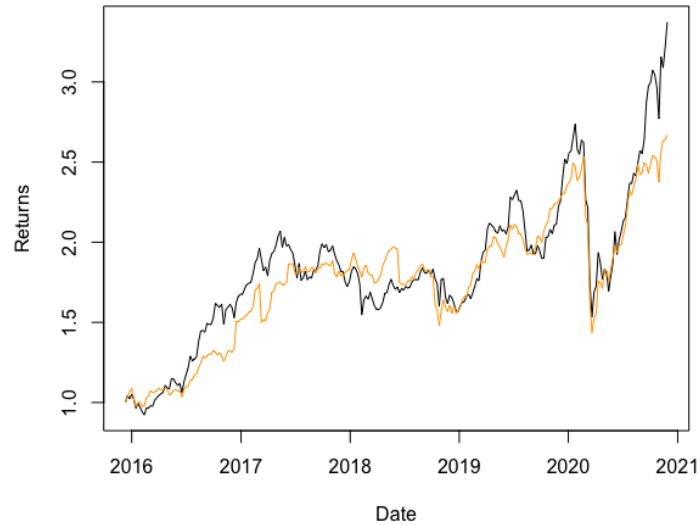


Figure V
Returns of Investor and the Underlying Portfolio (Framework 1)

This figure plots the accumulated returns of the investment company (Investor, in black) and the returns of the accumulated underlying portfolio (in blue), calculated through Framework 1. The returns of Investor are the market capitalization returns. The graph plots the returns between 2015-12-31 and 2020-12-31. The returns are indexed to 1.00 as of 2015-12-31.

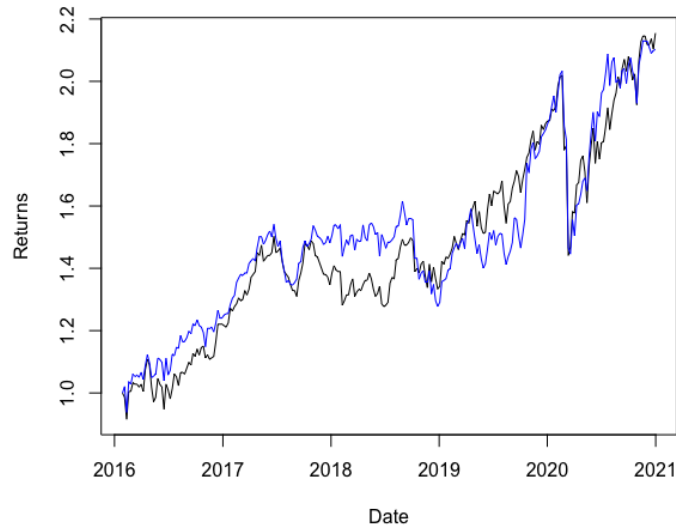
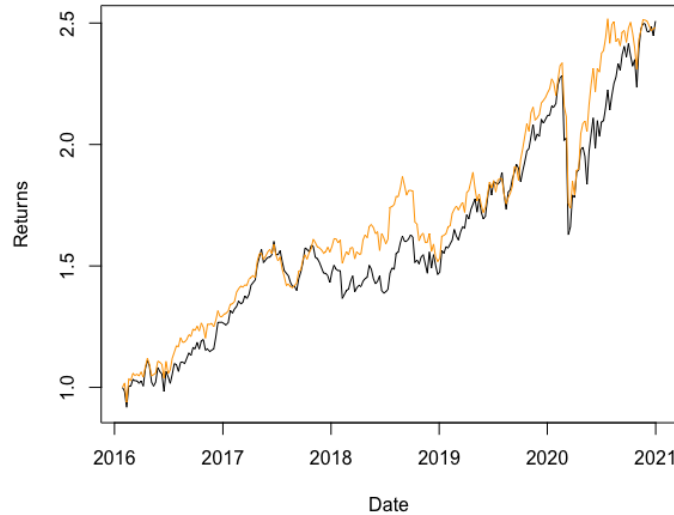


Figure VI
Returns of Investor and the Underlying Portfolio (Framework 2)

This figure plots the accumulated dividend adjusted returns of the investment company (Investor, in black) and the accumulated dividend adjusted returns of the underlying portfolio (in yellow), calculated through Framework 2. The returns of Investor are the dividend adjusted market capitalization returns. The graph plots the returns between 2015-12-31 and 2020-12-31. The returns are indexed to 1.00 as of 2015-12-31.



Visibly, in all six figures, the returns of the investment company and its underlying portfolio deviate from each other. Although the underlying portfolio of Industrivärden consists of 100% listed, and therefore, fully observable holdings, the returns are not identical. Even if the returns seldomly are in constant relation to each other, there is a tendency that the returns of the investment company and its underlying portfolio eventually coincide at some point in time whenever the returns have deviated from each other. The same reasoning goes for Svolder in figures III-IV since its underlying portfolio also consists solely of listed companies.

Since the relative returns in both Svolder and Industrivärden and their respective underlying portfolios seem predictable, it is interesting to examine the returns in an investment company when a part of the underlying portfolio consists of unlisted companies. In figures V-VI the returns of Investor and its underlying portfolio, which consists of an average of 77% listed companies, is plotted. Similar to Svolder and Industrivärden, the returns of Investor and its underlying portfolio seem to coincide over time, indicating that even when part of the underlying portfolio consists of unlisted companies, the relative returns may be predictable. Indeed, the fraction of unlisted holdings creates a dimension of uncertainty that is absent in the case of Industrivärden and Svolder.

There seems to be a relative return predictability when there is a temporary deviation of the return of the investment company and the underlying listed assets. In other words, there appears to be a relative return predictability when the NAV discount/premium deviates from the average NAV discount/premium. We have conducted a theoretical trade to explore whether the deviation in returns of the investment company and the underlying listed portfolio could be exploited in order to generate a return from the potential predictability in relative returns. Studying Figure I, a period of deviation can be spotted in the returns over a four-month period in 2018. In order to

investigate the possibility of exploiting this deviation and pattern to generate a predictable return, a short position in the underlying portfolio and a long position in Industrivärden was taken during this period, since the investment company seemed to be undervalued relative to its underlying portfolio from a historical perspective. In Table III, the net position of the trade and specific time frame is presented where a long and short position with 100,000 SEK respectively has been entered. The position would be initiated when the returns deviate and be closed when the returns eventually coincide. In this specific trade, the end-date is 2018-11-09. As presented in Table III, a net position of 8,219.03 SEK would have been generated from this trade. Evidently, this suggests that the relative return predictability can be exploited in order to generate a predictable return, if this historically observed pattern is to be repeated in the future.

Table III
Example of Exploitation of Relative Return Predictability

This table shows the returns of a long position in Industrivärden and a short position in its underlying portfolio between 2018-07-06 and 2018-11-09. This time-period was chosen based on the identified deviation of the two indexed returns and the later observed merge in returns in Figure I. The short position in the underlying during the length of this position consisted of taking a short position in the stocks held by Industrivärden and a money account to appropriately replicate the net debt of Industrivärden. *Net Position* is the calculated net of the long position in Industrivärden and the short position in the underlying portfolio. The values are calculated without considering tax and transaction costs.

Date	Short Position: Underlying Portfolio	Long Position: Industrivärden	Net Position
2018-07-06	-100 000.00	100 000.00	0.00
2018-07-13	-101 638.40	100 252.47	-1 385.93
2018-07-20	-103 212.67	102 438.37	-774.30
2018-07-27	-105 607.45	104 709.89	-897.56
2018-08-03	-105 764.47	103 319.72	-2 444.75
2018-08-10	-105 830.02	106 144.43	314.41
2018-08-17	-105 973.28	104 901.34	-1 071.94
2018-08-24	-108 399.84	107 881.66	-518.18
2018-08-31	-109 592.91	110 373.91	781.00
2018-09-07	-106 403.27	106 152.02	-251.25
2018-09-14	-107 913.83	107 299.21	-614.62
2018-09-21	-109 947.29	110 373.68	426.39

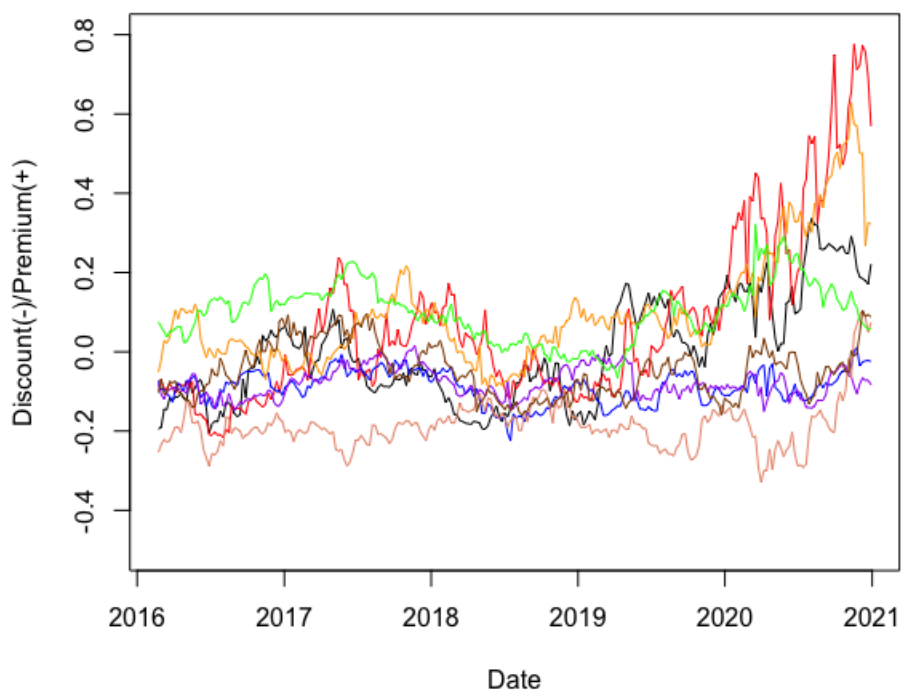
Table III ~ Continued
Example of Exploitation of Relative Return Predictability

Date	Short Position: Underlying Portfolio	Long Position: Industrivärden	Net Position
2018-09-28	-108 641.10	110 673.97	2 032.87
2018-10-05	-107 447.75	108 916.95	1 469.20
2018-10-12	-100 732.90	104 331.29	3 598.39
2018-10-19	-98 411.54	103 510.23	5 098.69
2018-10-26	-96 063.45	100 367.07	4 303.62
2018-11-02	-100 006.98	105 565.99	5 559.01
2018-11-09	-98 085.25	106 304.28	8 219.03

Another apparent result is the recent substantial increase in the market capitalization of the investment companies relative to the value of their underlying portfolios. Historically, most of the investment companies in our study have been traded with a discount on the value of their underlying portfolio, while a few have been traded with a premium. That is, the market value of the investment companies is lower/higher than the value of the underlying portfolio. Recently, however, the market capitalization of investment companies seem to have increased significantly more in value relative to the underlying portfolio. This trend is evident where the discount (premium) in the end-date of the observation period has decreased (increased) compared to the five-year historical average. Creades is the investment company where the difference between the end-date NAV premium and the five-year average is the greatest, with a difference of 40.64 percentage points. Seven of the eight observed investment companies now have a NAV discount (premium) lower (higher) than its five-year historical average, which might indicate that investment companies are overvalued relative to its underlying portfolio, at least in comparison to its historical valuation. Only one investment company is within one standard deviation of its historical average NAV. We call this concept *investment company bubble*. Nonetheless, this may be appropriately labeled a bubble only if the recent relative increase in the market capitalization of the investment companies relative to their respective underlying portfolios is unjustified. In the analysis, we will investigate further whether the recent development is justified from a NAV perspective. The historical NAV discount/premium of the eight investment companies are presented graphically in Figure VII.

Figure VII
Net Asset Value Discount/Premium of Investment Companies

This figure presents the NAV discount/premium for the eight investment companies during our observation period. Each color represents an individual company. The different colors and companies are specified beneath the graph. A calculated NAV discount is negative (below 0.0) and a calculated NAV premium is positive (above 0.0). The NAV discount/premium is calculated by dividing the market value of the investment company with its underlying NAV (the total value of the holdings in the underlying portfolio).



Black = Bure; red = Creades; blue = Industrivärden; purple = Investor; salmon = Kinnevik; orange = Latour;
green = Lundberg; brown = Svolder.

Table IV
Net Asset Value Discount/Premium

This table shows the five-year historical average NAV discount (-) or premium (+) of each of the eight investment companies. *SD* is the calculated standard deviation of the discount/premium during the observation period. *End-date in observation* is the NAV discount/premium at the end-date of the observation period. *Difference* presents the difference between the NAV discount/premium at the end-date observation and the five-year historical average NAV discount/premium, presented in percentage points (p.p.).

Net Asset Value Discount(-)/Premium(+)				
	Average	SD	End-date in observation	Difference
Bure	0.05%	13.34 p.p.	22.13%	22.08 p.p.
Creades	8.00%	22.20 p.p.	48.64%	40.64 p.p.
Industrivärden	-8.83%	4.17 p.p.	-1.96%	6.87 p.p.
Investor	-7.89%	3.70 p.p.	-5.88%	2.01 p.p.
Kinnevik	-18.41%	6.65 p.p.	5.56%	23.97 p.p.
Latour	10.20%	14.43 p.p.	35.47%	25.27 p.p.
Lundberg	10.02%	7.39 p.p.	5.86%	-4.16 p.p.
Svolder	-4.49%	6.90 p.p.	13.33%	17.82 p.p.

V. Analysis

In this section we will discuss our main results from the correlation tests, regression tests and the implications that the results have on our hypothesis. Additionally, the concept of the investment company bubble and the exploitation of the relative return predictability will be elaborated on more thoroughly.

A. Correlation analysis

The correlation results show that the returns of the investment company correlate well with the returns of the underlying portfolio, both when the returns are calculated through Framework 1 and Framework 2. The dividend adjusted portfolio (Framework 2) correlates slightly better than the unadjusted portfolio (Framework 1) in all the investment companies, except Svolder. This could be explained by the net debt not having a direct effect on the returns in the underlying portfolio, but rather an indirect effect through the levered portfolio formula. This finding suggests that investors recognize that net debt in-between quarters is an uncertain figure and thus rather calculate the effect of net debt on the returns of the underlying portfolio through the levered portfolio formula.

An explanation to why the returns of Svolder correlate better with the returns calculated through Framework 1 compared to Framework 2 can be found in the scope of the transactions during the observed period. The returns of investment companies that have sold or bought a substantial amount of assets relative to their portfolio size should correlate better with the returns calculated through Framework 1 since these transactions have been adjusted for in net debt as it has become known to the public, in contrast to Framework 2. During the observed period Svolder executed 324 trades in listed companies compared to the median number of 29 of trades in listed companies executed during the observed period. (Appendix IV.)

B. Regression analysis

The regression analysis presented no evidence of a systematic lag in the returns of the investment company. The interpretation of this is that investors incorporate the information of the underlying portfolio quickly, which eliminates the return predictability on a weekly basis. The returns of the underlying portfolio at time t explain the majority of the returns in the investment company at time t . The absence of systematic price drift indicates that investors are attentive to the information of the underlying portfolio when pricing the value of the investment company. Thus, the null hypothesis stating that investors immediately, at least within a week, incorporate all available information when valuing the investment company cannot be rejected.

However, individual cases of clear and significant price drifts have been found in Industrivärden and Lundberg. It appears to take two weeks for some of the movements in the underlying portfolio of Industrivärden to be reflected in its share price, while a reverse effect on the share price of Lundberg was identified with a one-week delay. These findings suggest that there are individual cases where investors are inattentive to all available information and that there are predictable price drifts affecting the share price of some investment companies.

These findings, however, do not contradict previous research and findings regarding investors' limited attention. It merely suggests that investors are attentive towards changes in the value of investment companies' underlying portfolios and quickly (at least the same week) incorporate that information into the share price of investment companies. The holdings of investment companies and the changes in value are easily accessible and effortlessly trackable, enabling investors to be considerate of changes and react appropriately when valuing the investment company.

An important dimension of the analysis is the portion of unlisted holdings in the underlying portfolio. As explained previously, the unlisted assets have no market value, but a proposed value stemming from the own valuations that the investment companies perform and present in their interim and annual reports. News and value updates about the unlisted companies are seldom presented in-between interim reports. Therefore, our hypothesis implicitly suggested that the returns of investment companies with a smaller fraction of unlisted companies in their underlying portfolio would deviate less from the returns of the listed holdings in its portfolio.

When plotting the returns of the investment companies with its underlying portfolio (only listed holdings), the two graphs differ. Even in the two investment companies with 100% listed holdings in the underlying portfolio (Industrivärden and Svolder), the returns differ. There might be other factors than the returns of the underlying portfolio that is incorporated into the stock price of the investment company. Malkiel (1977) presents several explanations for this, as described in section I. For instance, management's ability to find future investment cases may be questioned, which implies that investors do not believe in the investment company's ability to deliver value in the future. Incorporating this kind of information into the stock price is then reflected in the investment company and not in its underlying portfolio. If investors instead have greater faith in management

than previously, the stock price of the investment company might increase relative to the underlying portfolio. This can also explain the variation in NAV discount/premium that is observed in the time frame of this study and why there is no one-to-one relationship between the 100% listed underlying portfolio and the investment company.

Therefore, even in an efficient market as explained by Fama (1970), the stock price development of an investment company with fully observable holdings might deviate from the development of its underlying portfolio since information other than stock price development of the underlying portfolio is incorporated in the stock price of the investment company. Indeed, the returns of the underlying portfolio are more easily quantified and more easily measurable than non-quantitative factors (such as management's ability to invest). So, to translate this non-quantitative information into the stock price movement of the investment company is undoubtedly difficult.

For investment companies with unlisted holdings, there may be additional dimensions of factors that play a role in the valuation of the investment company. Although investment companies disclose own valuations of the unlisted companies to enable them to make an estimated NAV of its total holdings, the valuation technique used may differ substantially from company to company. Some use multiple-valuations, others use market valuations through discounting the expected future cash flows of the company. Another valuation technique is to use the latest transaction value. Due to the nature of these different valuation models, with assumptions regarding the discount rate and future cashflows, a broad spectrum of valuations of the unlisted companies in the underlying portfolio emerges. Depending on the assumptions and expectations, investors may value these unlisted holdings very differently than the investment company. In contrast to the unlisted companies, listed companies have a market price, which should reflect the consensus valuation of that specific company. If investors value the unlisted companies differently than the investment company does, this will be reflected in the stock price of the investment company.

Moreover, because of the more extensive regulatory requirements of companies listed on a stock exchange, "new" information regarding the unlisted holdings rarely come out more often than on a quarterly basis in the interim reports. Since our regression analysis was made on a weekly basis, this might impact the results. However, studying Svolder and Industrivärden, whose underlying portfolios both consist of 100% listed companies, the regression analysis results did not differ compared to the other six investment companies, whose underlying portfolios consisted of both listed and unlisted companies. This could suggest that investors are more inclined to follow and to analyze the listed holdings than the unlisted holdings of investment companies due to a lack of information and increased difficulty in analyzing unlisted companies.

Another explanation of this discovery can be found in the separate growth of the listed and unlisted assets. Considering both the percentage of listed assets in the portfolio, and the correlation between the listed and unlisted assets, the explanation to this discovery seems to have been unveiled. In other words, investors do price in changes in unlisted assets. However, in some companies listed and unlisted assets tend to move in the same direction which at first creates the false belief that investors, in varying degree, do not price in changes in the unlisted assets. (see the specified details of the unlisted holdings in Appendix V.) Nonetheless, the valuation of the unlisted assets is performed by the investment companies since there are no observed market prices. There are several different valuation methods that may have an impact on the disclosed value of the unlisted assets in the underlying portfolio. Thus, the calculated returns of the unlisted assets may not represent the "fair" returns of the unlisted assets or the market view of the returns since this is

based on the valuations presented by the investment companies in their interim reports. For example, an unlisted holding valued through a discounted cash flow model is probably valued differently compared to if the same holding would be valued from the latest transaction.

C. Exploitation of Relative Return Predictability

Studying the return of the investment company to its underlying portfolio of listed holdings, our results showed that there is historical pattern that the returns coincide with each other after a period of divergence. This tendency seems to create a relative return predictability. It is difficult to observe how the unlisted part of the underlying portfolio is developing. Hence, the relative return predictability can be viewed as “more” predictable if a larger part of the portfolio consists of listed holdings. The ideal underlying portfolio to exploit this would therefore be an underlying portfolio consisting solely of listed companies, such as the ones of Svolder and Industrivärden. Exploiting this return predictability would theoretically be possible even in the investment companies with unlisted assets.

However, practically, replicating such a portfolio is challenging, given the limited possibilities of investing in companies not listed on a stock exchange. Additionally, replicating a portfolio with unlisted assets implies another dimension of risk that is quite problematic. Investment companies disclose details about the unlisted holdings in their interim reports, or sometimes only in their annual reports. Since unlisted companies are under less regulatory surveillance than listed companies, there are rarely updates of their holdings more frequently than on a quarterly basis. Constructing a replication of the portfolio implies that one would need this specific information in conjunction with the transaction to mimic the transactions of the investment company as close as possible. If the investment company invests/divests in a company and the replicating portfolio does not follow the actions of the investment company, the returns are not fully replicated, and one would not make notice of the deviation until the transaction appears in the next interim report. This is a dimension of risk that is difficult to hedge against. Therefore, we would suggest a focus on investment companies with 100% listed holdings in the underlying portfolio.

The theoretical concept of exploiting the return predictability to generate a return is valid even if the investment companies have holdings that are not listed on a stock exchange. Worth noting, however, that a deviation in the returns of the investment company and the listed assets may be driven by the unlisted holdings. Investors may value the unlisted holdings differently, which drives the returns of the investment company apart from the returns of the listed assets. Certainly, this would decrease the chance of exploiting the relative return predictability. Given that the historical pattern of the returns is repeated in the future, this can be exploited, as outlined in Table III. However, this trade is simplified and is presented before transaction costs and tax.

D. Investment Company Bubble

The NAV discount (premium) has decreased (increased) for all investment companies in our study, except for Lundberg, when comparing the NAV discount/premium on a five-year historical average with that of the end-date of the observations.

Since the value of the investment company relative to its underlying portfolio generally is on an all-time-high, we named this phenomenon an investment company bubble. Indubitably, this is correctly labelled only if it is a bubble. That is, this decrease (increase) in the NAV discount (premium) must be unjustified from a valuation perspective.

As presented in figure VII, until recently, the historical NAV discount/premium has not fluctuated much. Because of the recent decrease (increase) in the NAV discount (premium) in the investment companies, one could exploit this opportunity by taking a short position in the investment company, and a long position in the underlying portfolio. If the same historical pattern will be repeated, the returns will eventually coincide, and one could earn a return on the predictable pattern.

As mentioned under section I, Malkiel (1977) gives a few explanations to why the NAV might deviate from the value of the holding entity (investment company in our study). With these explanations in mind, the recent decrease (increase) in the NAV discount (premium) may be justified. For example, perhaps management compensation has decreased recently, or the perceived managerial ability to achieve above-average returns has increased. However, these explanations seem non-applicable given the magnitude of the decrease (increase) in the NAV discount (premium). Malkiel (1977) also argues that larger investments in restricted stocks and less accessible foreign stocks can decrease (increase) the discount (premium). However, given the weight of the significant change in the NAV discount/premium, investors' perception and valuation of holding such stock must have changed dramatically. In other words, it seems as if the sudden decrease (increase) in the NAV discount (premium) is, from this point of view, more or less unjustified. Naturally, this presents an excellent opportunity to extend our research and findings. Factors such as management compensation, investors' valuation of the holdings of restricted and foreign stock and managerial ability to find value-creating investments could be included in an attempt to explain the recent change in the NAV discount/premium.

Indeed, a longer time period of data would be desirable to validate the results on an even broader scale. We have identified a relative return predictability in our five-year time frame. Undoubtedly, to identify the same results repeatedly on a research time frame longer than five years makes the results more robust. Moreover, the tendencies we have identified that the returns of the investment company and the listed assets tend to deviate, and then coincide, may be a pattern recognized only in this select time period. Recognizing the same pattern over a longer time period would make the results stronger.

VI. Conclusion

This paper suggests that investors generally are attentive to information about the underlying portfolio when valuing the investment company. However, this should not be interpreted as evidence against the concept of limited attention. Rather, it suggests that investors are more attentive to the information about investment companies and their underlying portfolios. This implies that there is no archetype strategy to exploit predictable lagged price movements to yield systematic abnormal returns, in contrast to what previous research has concluded regarding investors' limited attention.

Additionally, we identified a historical pattern in the returns of the investment company relative to its underlying portfolio where the indexed returns, at times, deviate and eventually coincide. Naturally, there are other factors than the underlying portfolio that investors may include in their valuation of the investment company. For example, unlisted, unobservable, assets without a market value in the underlying portfolio or perceived managerial ability to find profitable investments that lead to variations in NAV discount/premium.

However, the pattern was repeated during the observed time period. The relative return predictability presents a trading opportunity for investors to exploit, given that the historical pattern is repeated in the future. Furthermore, in the later part of the observed time period in the

study, the NAV discount (premium) of the observed investment companies has decreased (increased) dramatically when comparing with the historical average. This sudden change could be explored in further detail to determine whether it is legitimate or not from a valuation perspective.

Finally, our study may be interpreted in line with the semi-strong efficient market by Fama (1970), where investors incorporate all publicly available information when pricing assets. It seems as if investors can, without a delay, price the investment company in line with information about the underlying portfolio.

We believe that the research can be extended by further specifying the model regarding unlisted assets and using an extended time frame. Moreover, research about what factors drive the described temporary deviations in the NAV discount/premium could be explored further to better understand the observed discrepancies in valuation of the investment companies relative to their underlying portfolio.

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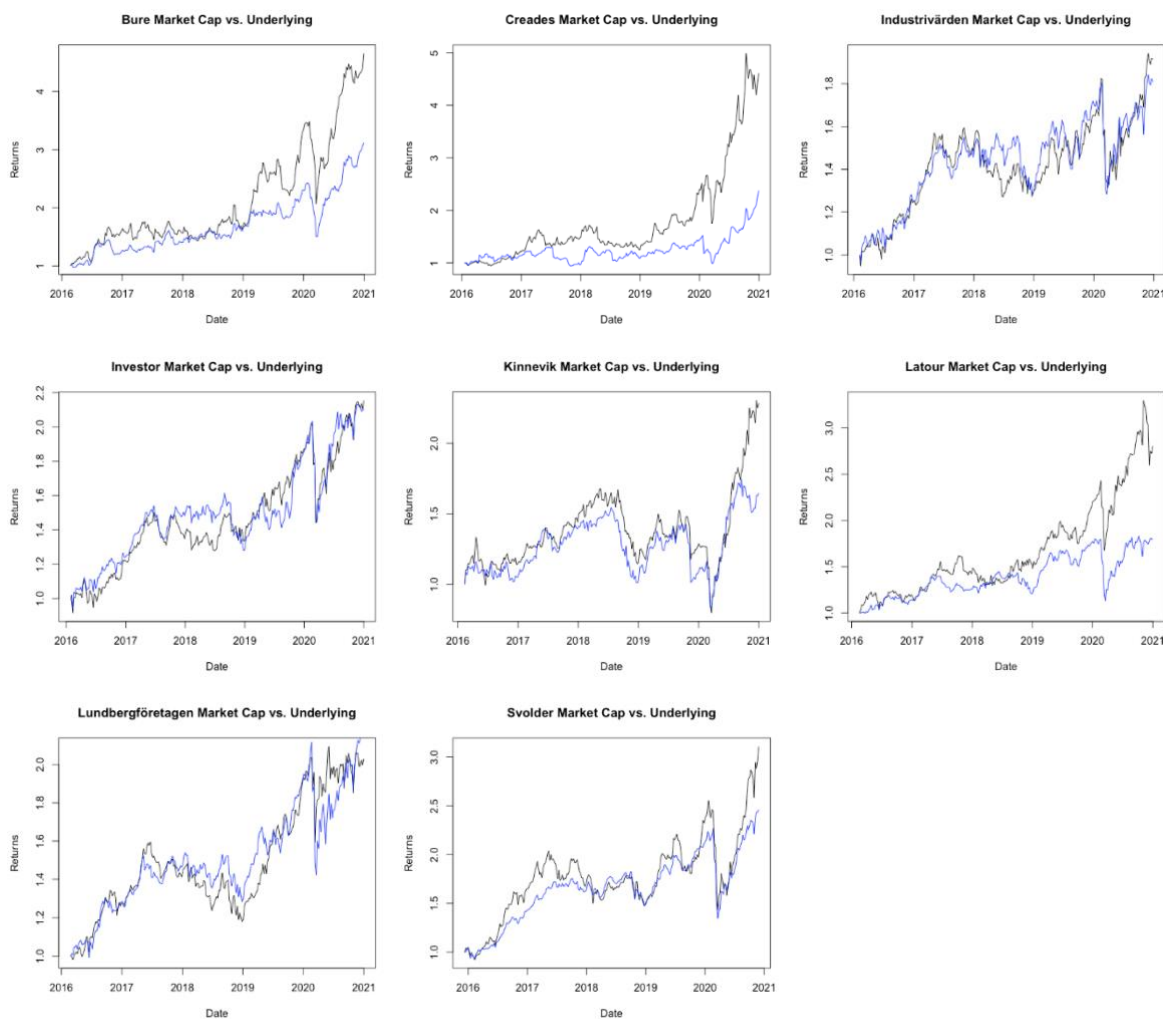
Appendix I.
Investment Companies Included in the Study

Registered company names are stated first, and short names used in our study are presented in brackets.

Bure Equity AB (publ) [Bure]
Creades AB (publ) [Creades]
Aktiebolaget Industrivärden (publ) [Industrivärden]
Investor AB (publ) [Investor]
Kinnevik AB (publ) [Kinnevik]
Investment AB Latour (publ) [Latour]
L E Lundbergföretagen Aktiebolag (publ) [Lundberg]
SVOLDER AB (publ) [Svolder]

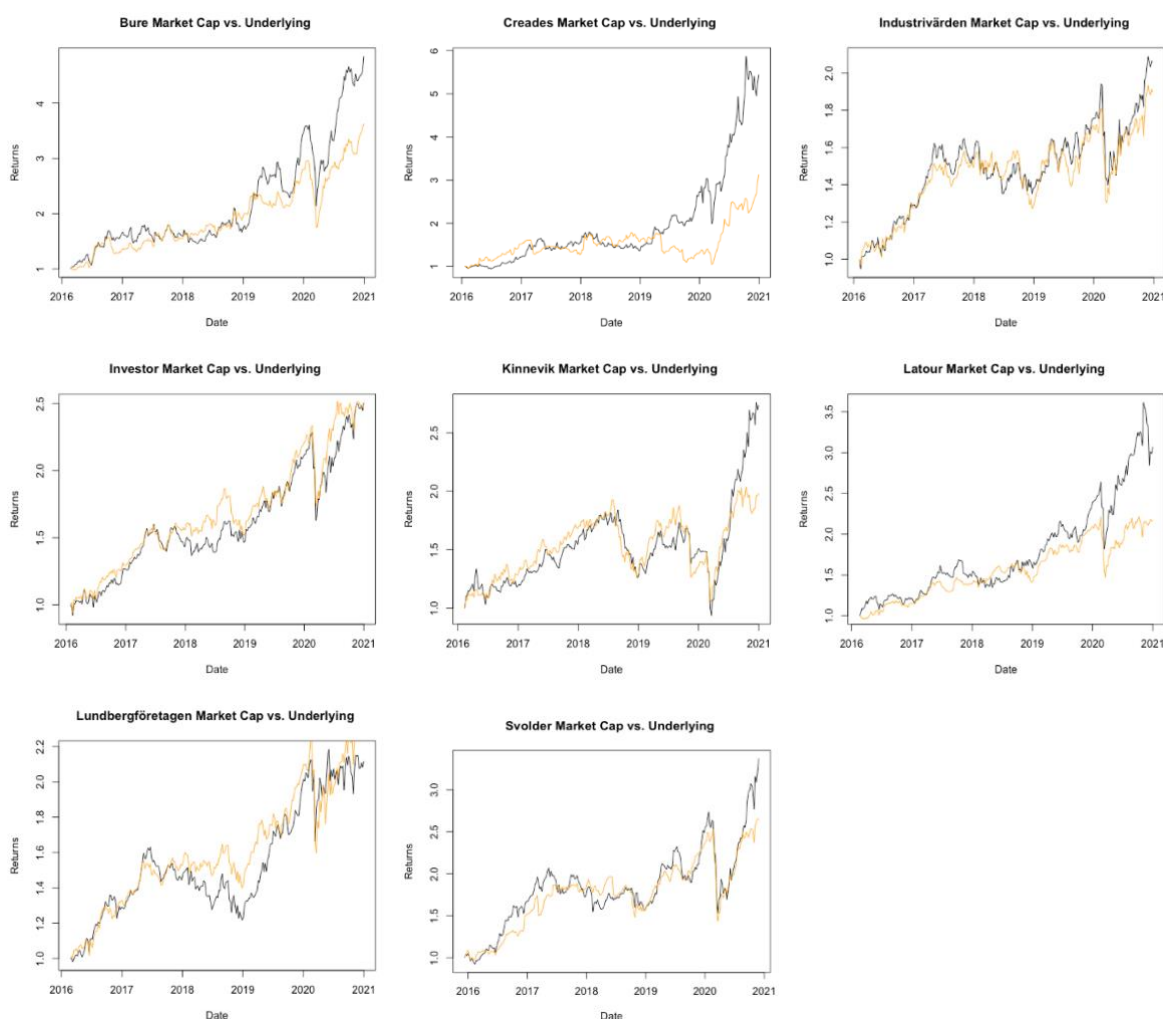
Appendix II. Returns of the Investment Companies and Their Respective Underlying Portfolio Less Net Debt

These figures plot the returns of the investment company (in black) and the returns of the underlying portfolio (in blue), defined as the underlying listed assets less net debt. The returns of the investment company are the market capitalization returns. The graph plots the returns between the period of study, which is 2015-12-31 to 2020-12-31 for all investment companies except for Svolder, where the study of observation is between 2015-11-30 and 2020-11-30. The returns are indexed to 1.00 as of 2015-12-31.



Appendix III. Returns of Investment Companies and Their Respective Leveraged Dividend Adjusted Underlying Portfolio

These figures plot the dividend adjusted returns of the investment company (in black) and the dividend adjusted returns of the underlying portfolio (in yellow), defined through the dividend adjusted leveraged portfolio formula. The returns of the investment company are the dividend adjusted market capitalization returns. The graph plots the returns between the period of study, which is 2015-12-31 to 2020-12-31 for all investment companies except for Svolder, where the study of observation is between 2015-11-30 and 2020-11-30. The returns are indexed to 1.00 as of 2015-12-31.



Appendix IV. Total Number of Observed Changes in the Underlying Portfolio

This table presents the total number of observed changes in the investment companies' respective underlying portfolios during the observation period. *Average* is the average number of observed changes in the underlying portfolio. *Median* is the median number of observed changes in the underlying portfolios.

	Changes
Bure	29
Creades	29
Industrivärden	55
Investor	26
Kinnevik	28
Latour	21
Lundberg	45
Svolder	324
Average	69.63
Median	29

Appendix V. Growth in Unlisted Assets

This table presents the returns between 2015-12-30 and 2020-12-30 of the listed assets and unlisted assets in the underlying portfolios of the six investment companies that have unlisted holdings. *% Listed* shows the average percentage of listed assets during the observed time period. *Return Listed* and *Return Unlisted* shows the total return of the listed assets and the total return of the unlisted assets, respectively, during the observed time period. *Correlation* shows the correlation between quarterly returns of listed underlying assets and the quarterly returns of unlisted underlying assets during the observed time period. R^2 shows how well the independent variables put forward through *Framework 2* explains the proportion of variance of the dependent variable *dividend adjusted returns of the investment company*.

	% listed	Return Listed	Return Unlisted	Correlation	R^2
Bure	89%	255.92%	165.36%	0.851	0.484
Creades	63%	203.44%	384.67%	0.716	0.110
Investor	77%	98.52%	110.56%	0.781	0.694
Kinnevik	85%	81.53%	44.61%	0.420	0.521
Latour	71%	85.70%	136.25%	0.887	0.450
Lundberg	81%	111.84%	53.03%	0.857	0.573

Appendix VI.
Regression Model

Below, the regression model with the specified variables used in the study is presented.

$$R_{i,t} = \beta_0 + \beta_1 * (R_{iFx,t}) + \beta_2 * (R_{iFx,(t-1)}) + \beta_3 * (R_{iFx,(t-2)}) + \varepsilon_i$$

$R_{i,t}$ = return of the investment company at time t

β_0 = intercept

$R_{iFx,t}$ = return of the underlying portfolio through Framework x at time t

$R_{iFx,(t-1)}$ = return of the underlying portfolio through Framework x at time (t-1)

$R_{iFx,(t-2)}$ = return of the underlying portfolio through Framework x at time (t-2)

ε_i = residual term