LISTED PROPERTY COMPANY VALUATION

A QUANTITATIVE STUDY OF THE SWEDISH MARKET DURING 2011-2020

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Master's Thesis

Stockholm School of Economics

2022

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Abstract:

Among stock market participants, the existence and persistence of deviations between a property company's market capitalization and Net Asset Value are well-recognized. This deviation has a clear link to the premiums and discounts to NAV of closed-end funds, which is referred to as the closed-end fund puzzle in financial economics. As it undermines theories of market efficiency and persistently violates the law of one price, it has generated a significant amount of research. When exploring potential explanations, two schools of theory stand out within the existing literature: the rational firm-specific theory and the behavioral noise trader model. The rational firm-specific theory suggests that the deviations are fundamentally linked to company-specific factors while the noise trader model suggests that the deviations are caused by changes in the noise trader sentiment. This paper explores the changes in quarterly NAV premium and discounts between 2011 to 2020 among Swedish listed property companies, which has not been extensively tested before. By applying three OLS regression models on cross-sectional data, we find that both rational firm-specific factors such as size, debt ratio, management's reputation, insider and strategic ownership, and volatility as well as behavioral variables contribute to the NAV deviations. However, we find that including company- and quarter fixed effects heavily increases the explanatory power of the regressions, suggesting that there are variables unaccounted for in the model which opens up for further research.

Keywords:

Listed Swedish property companies, Closed-end fund puzzle, Noise trader model, NAV premium and discount, Property company valuation

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Master's Thesis
Master Program in Finance
Stockholm School of Economics

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1. Introduction

Net asset value (NAV), defined as the market value of a property company's portfolio less its liabilities, is a crucial metric when measuring performance and valuing property companies (Ke, 2015). While the properties are priced in the direct property market, the shares of listed property companies are priced in the equity market, and the law of one price implies that the market capitalization should equal NAV. In practice, however, most property companies systematically breach this condition and trade at a premium (Market Capitalization > NAV) or discount (NAV > Market Capitalization), thus persistently violating one of the most fundamental theories in financial economics. The persistence of the deviations from NAV is remarkable as previous studies have shown that the performance of real estate investment trusts (REIT) has displayed stronger co-movement with the direct property market than the stock market (Hoesli and Oikarinen, 2012; Gyourko and Keim, 1992; Yunus, Hansz and Kennedy, 2012). Regardless, deviations from NAV are widely recognized by stock market participants as well as by researchers and have within the existing literature been referred to as the *closed-end fund puzzle*.

Given the amplitude of these deviations as well as properties' significant role in societies and for the economy, a significant amount of research has been aimed to increase the understanding of why deviations from NAV occur. While the closed-end fund puzzle remains unanswered to date, researchers have managed to present two plausible explanations: *the rational firm-specific approach* and *the noise trader model*. The advocates of the rational approach suggest that premiums and discounts to NAV occur as a result of firm-specific drivers that are fundamentally linked to the value of a firm. The researchers that have tested the noise trader model, however, suggest that the deviations from NAV arise because of changes in the investor sentiment. Examples of company-specific variables are for instance: stock liquidity, size of the property portfolio, and the reputation of the management team (Morri, McAllister, and Ward, 2005; Ke, 2015), while the impact of noise traders is dependent upon how optimistic they are as a group (Barkham and Ward, 1999).

This study aims to further increase the understanding of the valuation of property companies, which merits attention for several reasons. The results of previous research have to a large extent yielded contradictory results, implying that the drivers in property company valuation are not fully understood yet. Furthermore, most congruent previous studies have focused on US-based REITs and UK-based property companies, and an exhaustive literature search suggests that the Swedish market has not been studied in-depth and remains underexplored. Moreover, many of the most influential previous papers were performed during the twentieth century during which most companies in these papers traded at a discount to NAV, while many Swedish companies nowadays trade at a premium and have done so during the last decade. Therefore, it is interesting to study how the drivers may have shifted over time. For these reasons, we have chosen to study the following research question:

Which factors drive valuation in Swedish property companies in relation to their NAV?

In the next section, a review of existing literature and the theoretical framework applied in this paper are presented. Thereafter, the data and methodology section present how data has been retrieved, the definition of the variables used in the empirical analysis, the empirical procedure, and the setup of the regression models. Then, the result section presents an overview of the empirical results generated and discusses their implications based on the previous literature. Lastly, the conclusion of the paper is presented as well as its research contributions and direction for future research.

2. Literature review

This section begins by introducing the relationship between the market capitalization and NAV of property companies. Then, it introduces the closed-end fund puzzle and its research implications. Lastly, it presents the existing theories about rational and behavioral factors that have been found to contribute to deviations of property companies' share prices from NAV.

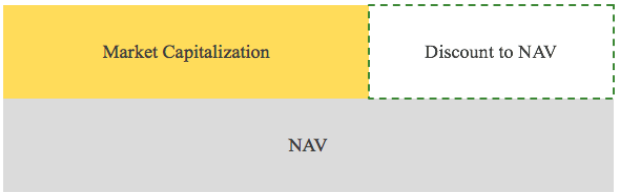
2.1. Property companies' market capitalization and Net Asset Value

Property companies' portfolios typically include a mix of commercial and residential real estate assets as well as development projects in progress (Dowling, 2005). The fair value of each property is assessed either by an independent valuation company or by the company itself using an internal process to appraise each property. A selection of the approaches commonly used to value properties are the cost approach, the sales comparison approach, and the income capitalization approach (Jackson, 2008). Another widely used valuation method for income-generating properties is the discounted cash flow analysis (DCF) (Leskinen, Vimpari, and Junnila, 2020). A further review of these methods is however beyond the scope of this paper.

Once the properties have been appraised, the company's NAV can be derived from the total market value of all properties, less the company's liabilities, which can be retrieved from its financial statements (i.e., balance sheet). Property companies' shares are generally valued with reference to NAV, and the stock prices tend to fluctuate between a premium and a discount to the NAV per share. However, the premium or discount to NAV can vary substantially over time and between companies within the same market, making it interesting to further understand the drivers of property company valuation (Ke, 2015; Malkiel 1977; Adams and Venmore-Rowland, 1990; Barkham and Ward, 1999).

Figure 1. An illustration of a NAV premium

Figure 2. An illustration of a NAV discount



2.2. Literature and conceptual framework

The phenomenon that the value of closed-end funds (CEF) deviates from NAV is a well-researched topic within financial economics that has received a lot of attention as it violates the law of one price. Among researchers, it has been referred to as the closed-end fund puzzle.

The closed-end fund puzzle is relevant in the context of property company valuation because of the structural resemblance between CEFs and listed shares of property companies. Similar to a CEF, a property company is essentially a pool of assets, and an investor wishing to exit an investment in a property company share must sell the shares at the stock market, as opposed to redeeming them at NAV which is possible in open-ended funds (Lee, Shleifer, and Thaler, 1991). For that reason, researchers have applied the closed-end fund puzzle and associated theoretical concepts when attempting to explain deviations from NAV in REITs and listed property companies' share prices.

Many researchers have attempted to resolve the closed-end fund puzzle, but regardless of which approach that has been applied, the conclusions have generally been contradicting and yielded different results (Morri and Benedetto, 2009). One of the first researchers to study the closed-end fund puzzle was Malkiel (1977) who proposed that discounts to NAV emerged because of firm-specific factors such as capital gains tax liabilities, distribution policy (i.e., dividends), and management fees. Despite that

Malkiel with some success could explain why CEFs' market capitalizations deviated from NAV, he concluded that the evidence was not sufficient to justify the magnitude of the deviations and thus concluded that CEFs provide an example of systematic mispricing in the capital markets. Following the research of Malkiel, many other researchers have attempted to supplement his contribution by adding other explanatory variables, with varying success, to explain NAV deviations.

However, there are many researchers that on the contrary have suggested that the deviations mainly are a result of irrationality among traders rather than fundamental drivers. This has been hypothesized to cause the prices of property companies to systematically deviate from their fundamental value. These observations have led to the formation of the noise trader model which researchers have attributed to the share price deviation from NAV.

In the next section, the theoretical framework is outlined by presenting the previous research findings of the rational and the behavioral drivers that affect the discount and premium to NAV.

2.2.1. Rational firm specific factors that drive premiums and discounts to NAV

Many researchers have tried to attribute the deviations from NAV to firm-specific variables that rational stock market participants evaluate when making investments in listed property companies. A comprehensive list of explanatory variables is outlined below that have been examined historically and have been found to affect the premiums and discounts to NAV of European property companies as well as REITs.

Size: Most existing papers have documented that large property companies or REITs tend to trade at lower discounts (or higher premiums) to NAV. Anderson, Connor, and Liang (2001) provided evidence that large REITs trade at lower discounts and suggested that this reflects the benefits of economies of scale and easier access to capital markets. In the context of European property shares, Brounen and Laak (2005) obtained similar results as smaller firms in their sample traded at higher discounts to NAV, which the authors suggested is a result of the lower level of media and analyst coverage which increases the information asymmetry which in turn leads to a lower valuation. Furthermore, Capozza and Korean (1995) and Clayton and MacKinnon (2000) found

that larger REITs trade at a premium compared to smaller REITs in their respective papers.

Moreover, Adams and Venmore-Rowland (1990) and Gau (1987) have also assessed the impact of size. These authors argued that larger property companies benefit from decreased competition in auctions for high-priced properties as smaller property companies that face capital constraints lack the resources to acquire these assets. As a result of the limited competition large property companies face in auctions for these properties, they typically achieve a higher ROI and thus earn abnormal returns, implying that large firms should trade at a premium (or a lower discount) to NAV.

However, Barkham and Ward (1999) who studied UK property shares, provided evidence that implied that bigger firms should trade at a discount. They suggested that a big company that was about to be liquidated would face illiquidity on the direct property market when divesting its property portfolio. This would force big companies to divest the assets at a price below NAV, which smaller firms would not be affected by to the same extent. Hence, the sum of a big property company's assets does not correspond to the value they would be able to dispose of them at due to illiquidity in the direct property market, which implies a negative correlation to NAV premium. Malkiel (1995) also tested the impact of size on CEF valuation but found no significant correlation. To conclude, most previous papers imply that greater size is rewarded with an increased valuation to NAV.

Debt ratio: The debt ratio, which is defined as the debt to total assets ratio, has an ambiguous relationship with the discount and premium to NAV. Generally, the amount of debt included in the capital structure of property companies is high compared to most other industries as a result of the predictable income streams and the high level of asset-backing. Adams and Venmore-Rowland (1990) and Morri et al (2005) found that financial gearing (i.e., using leverage to finance an acquisition of a property) can be a source of both discounts and premiums to NAV. When the sentiment is strong, investors generally allocate their capital to property companies with relatively high levels of leverage to maximize return on equity (ROE), assuming that return on investment (ROI) exceeds the cost of debt financing. In the opposite scenario when the sentiment is weak or when interest rates are high, highly levered companies are typically more volatile and

exposed to risk because of their dependency upon variable-rate debt financing, which decreases the valuation compared to NAV.

Clayton and MacKinnon (2000) tested the leverage variable and found that a higher leverage ratio was associated with a higher premium to NAV for REITs. This result corresponds to the conclusion of Barber (1996) who suggested that debt induces discipline of management and thus reduces agency costs. The same results were found by Morri et al (2005), but the authors were cautious to draw any definite conclusions given the impact of the prevailing market conditions. On the contrary, several other studies have found that a higher leverage ratio is positively correlated with a discount to NAV. Anderson et al (2001) proposed that debt increases the discount to NAV in the context of REITs as it reduces financial flexibility and increases the property company's exposure to risk. Brounen and Laak (2005) and Bond and Shilling (2004) found the same results in their respective paper. To conclude, the relationship between the debt ratio and the valuation to NAV is not straightforward nor established within the existing research.

Performance-based ratios: In addition to the variables mentioned so far, there are performance-based ratios that investors make use of when assessing property companies. Adams and Venmore-Rowland (1990) suggested that a high price-to-earnings ratio (P/E ratio) is associated with a lower discount (or higher premium) reflecting expectations of earnings growth. Morri et al (2005) found the same relationship between ROE and discount to NAV, where a high ROE implied a lower discount (or higher premium) to NAV. Barber (1996) reached the same conclusion and suggested that investors are willing to pay a premium for Real Estate Limited Partnerships (RELP) that have displayed superior past performance.

Liquidity: One of the main benefits of investing in property companies or REITs, as opposed to investing directly in properties, is believed to be the greater liquidity of the stock and the decreased transaction costs (Benveniste, Capozza, and Seguin, 2001; Adams and Venmore-Rowland, 1990). Capozza and Seguin (1999) used the dollar trading volume as a proxy for the liquidity of REITs and found that high liquidity was associated with lower discounts to NAV. The same results were found by Clayton and Mackinnon (2000), Ke (2015), and Barber (1996) who used the bid-ask spread, and

Brounen and Laak (2005) who used the free float as a proxy for liquidity. These results correspond well with Amihud and Mendelson's (1987) research that showed that illiquidity is penalized by investors, which implies that liquid stocks are priced higher. On the contrary, Brounen, Ling, and Prado's (2013) results implied that illiquidity could be positively correlated with a premium to NAV. However, the liquidity variable was not statistically significant in this case.

Dividend yield: Several potential conclusions have been presented regarding the impact of the dividend yield on the premiums and discounts to NAV. Adams and Venmore-Rowland (1990) suggested that property companies with high dividend yields tend to reduce a discount or increase a premium to NAV. This corresponds to the evidence presented by Gemmill and Thomas (2002) and Malkiel (1977, 1995), although they obtained weak support. As a dividend represent a liquidation of a portion of the assets, Malkiel suggested (1977, 1995) that a shareholder of a CEF that trade at a discount would be better off if the CEF pays dividends. Barber (1996) suggested that a higher dividend policy implies reduced agency costs, which he supports with the conclusion of Lang and Litzenberger (1988) and Jensen's (1986) paper. On the contrary, Morri et al (2005) found opposite results as property companies with high dividend yields traded at greater discounts. Moreover, Morri and Benedetto (2009) found that the dividend yield was positively correlated with a discount to NAV. They suggested that the reason for why the discount emerged is that investors might prefer to retain their capital invested in the properties as opposed to having to reinvest it.

Management's reputation: Unlike some of the previously mentioned variables, management's reputation has a seemingly more straightforward relationship. Despite the difficulties of finding a truthful proxy for management's reputation, most papers have used the preceding years stock performance as a proxy to capture the abilities of the management to produce a superior shareholder return. Ke (2015), Brounen and Laak (2005), Morri et al (2005), Clayton and MacKinnon (2000), and Barkham and Ward (1999) have all used preceding returns and found a positive correlation between returns and NAV premium, implying that property companies that have overperformed in the past are rewarded. Malkiel (1977, 1995) applied the same approach and reasoning but obtained weak results.

Expense ratio: Most existing research indicates that property companies with low expense ratios achieve a greater valuation compared to NAV. Adams and Venmore-Rowland (1990) suggested that good cost control among management tends to lead to a premium valuation to NAV, which corresponds to Capozza and Korean's (1995) conclusion that small REITs are more costly to manage and thus trade at a greater discount to NAV. Ingersoll (1976) suggested that high management expenses are equivalent to a deadweight loss to shareholders and should thus increase the NAV discounts. Ingersoll suggests further that the discount to NAV represents the capitalized value of these expenses. A rationally appealing approach is presented by Gemmill and Thomas (2002), who suggested that higher management expenses represent agency costs. They suggested that these would lead to greater discount to NAV unless these are offset by a superior management performance in other areas which intuitively drives a premium valuation and offsets the impact of the expenses. This could possibly explain why Barkham and Ward (1999) and Malkiel (1995) did not receive support for the expense ratio variable in their respective papers.

Strategic & Insider ownership: Similar to leverage, the level of insider ownership has an ambiguous relationship with the valuation of property companies compared to NAV. Barkham and Ward (1999) suggested that an increased insider ownership could reduce the discount (or increase the premium) to NAV as it aligns the interests between management (i.e., the insiders) and shareholders and therefore reduces agency costs. The same results were found by Morri et al (2005) and Morri and Benedetto (2009) who found a negative relation between insider ownership and discount to NAV. Furthermore, Capozza and Seguin (2003) found evidence that REITs with a high share of insider ownership are valued higher relative to REITs with lower shares. On the contrary, Malkiel (1995) suggested that large insider ownership is expected to increase the discount to NAV as it reduces the chance of the fund being taken over and liquidated at NAV which would benefit the shareholders if the CEF traded at a discount to begin with. However, the variable was not statistically significant in Malkiel's paper. Ke (2015) found that UK-listed property companies with a high level of insider ownership usually are less liquid, and thus trade at a higher discount to NAV.

Risk: An increased level of risk is associated with a higher discount to NAV. Adams and Venmore-Rowland (1990) suggested that the increased volatility of the equity

market compared to the direct property market implies a discount to NAV. Bond and Shilling (2004) tested the influence of risk by using unsystematic risk measured by volatility as a proxy. They found that a high level of risk was associated with a greater discount to NAV for property companies. Similar results were obtained by Morri et al (2005) who used the three-year beta to capture exposure to systematic risk and found that a higher beta was associated with a greater discount. This conclusion was supported by the results of Clayton and MacKinnon (2000) and Ke (2015). Furthermore, Brounen and Laak (2005) applied the same variable definition but did not obtain statistically significant results, even though the expected sign implied the same conclusion.

2.2.2. The behavioral noise trader model

In addition to firm-specific variables, researchers have provided evidence that behavioral drivers also affect the value of property companies in relation to NAV, which has been referred to as the noise trader theory. The behavioral noise trader model was initially introduced by De Long, Shleifer, Summers, and Waldmann (1990), who suggest that there are two types of traders that participate in the stock market: the rational trader and the noise trader. Rational market practitioners trade based on available information and unbiased estimates of future earnings growth (Morri et al, 2005). Noise traders, as Kyle (1985) referred to them, on the contrary, make trading decisions based on the market sentiment, which may fluctuate unpredictably (De Long et al, 1990; Barkham and Ward, 1999).

The perhaps most influential contribution to the noise trader theory was made by De Long et al (1990). In their paper, they presented compelling evidence for the persistent impact of noise traders on stock prices. Because rational investors are risk-averse and hesitant to bet against noise traders, their impact can persist in the long run. As the noise trader sentiment is unpredictable, share prices can be driven both above or below the fundamental value and thus deviate from NAV. Shleifer and Vishny (1990), who supported De Long et al's (1990) conclusions, also found that the volatility of stocks increases in the presence of irrational investors (i.e., noise traders). As the sophisticated investors are risk-averse and unaware of the duration until the stock price reverts to its fundamental level, it implies a limitation to arbitrage. This explains why the deviations

can persist and why the mispricing is not arbitraged away by rational investors. Their conclusion was also supported by Cuthbertson and Nitzsche (2005).

Lee et al (1991), who tested De long et al's (1990) theory in the context of CEFs, made similar conclusions. In their article, the data implied that NAV discounts are lower when investors are optimistic and higher when investors are pessimistic and provided robust evidence that the noise trader effect is systematic and non-diversifiable (rather than idiosyncratic) and thus correlated across CEFs. Similar to De long et al's (1990) and Cuthbertson and Nitzsche's research (2005), Lee et al (1991) suggested that rational investors are hesitant to bet against the noise traders, and for that reason, deviations from the fundamental value can persist. Furthermore, they also suggested that the reason why CEFs in their study on average traded below NAV in their dataset was because the underlying assets are not exposed to persistent noise trader risk, while the shares of the CEFs are. This implies that the CEFs must earn a greater return than the assets in the portfolio to compensate for this additional risk, which implies that CEFs should be priced below NAV in equilibrium. Further support for the noise trader theory was obtained from Gemmill and Thomas' (2002) paper, which provided evidence that money flows from retail investors (i.e., noise traders) in UK CEFs, used as a proxy for noise trader sentiment, significantly affects the discount and premium to NAV.

Lastly, Barkham and Ward (1999) tested the noise trader theory in the context of listed property companies in the UK. They found evidence using indicators of noise trader sentiment such as an index of inflation expectations, industrial confidence, and consumer confidence which persistently correlated with the NAV discount variable. These results do not confirm the noise trader hypothesis, but they are consistent with the theory that market-wide sentiment clearly affects the valuation in relation to NAV. The impact of sentiment was also highlighted in Adams and Venmore-Rowland's (1990) article that suggested that changes in market sentiment typically affect all property companies' valuation in relation to NAV.

Hence, it is established that in addition to firm-specific variables, investor behavior and market sentiment also significantly affect the share price compared to NAV, which can drive both a premium and discount to NAV.

3. Data and Methodology

This section starts by introducing the sources of data and then the variable definitions. Then, the regression models and the empirical procedure are presented. Lastly, the summary statistic is presented.

3.1. The data

The data used in this paper covers the period 2011 to 2020. A gross list of 699 Nordic stocks[1] that are listed on the main market was retrieved from Nasdaq's website. By excluding stocks listed outside of Sweden and companies that are not classified as real estate companies by Nasdaq, the list was narrowed down to 46 traded securities. Then, companies that were listed after 2019-01-01 were excluded to ensure that the dataset includes at least one full year of data for all companies. Then, the latest annual report of each company that remained on the list was examined to filter out the companies whose real estate assets divided by total assets did not exceed 70%. This delimitation was important as the companies that remained on the list essentially could be divided into two groups: those that build properties (construction companies) and those that own and manage real estate (property companies). For this paper, only the latter group is relevant. The reason why this distinction was important was that the companies defined as construction companies have lower levels of asset-backing and a fundamentally different business model. While the valuation of property companies mainly focuses on the asset value of the property portfolio (i.e., NAV), the valuation of construction companies is mainly driven by profits (Adams and Venmore-Rowland, 1990). For that reason, it is unfeasible to include these companies within the scope of the research question. The companies that meet all the criteria detailed above are what we define as property companies within the scope of this study and are thus included in the dataset. Lastly, when the final list was prepared, the companies that have more than one share security listed on Nasdaq were only included once to avoid double counting. After these delimitations, a net list of 22 companies was obtained (see table 1).

[1] Retreived 2022-02-28

Table 1. Net list of companies included in Dataset

Company	Nasdaq Exchange	Company	Nasdaq Exchange
Atrium Ljungberg	Large Cap	Hufvudstaden	Large Cap
Balder	Large Cap	NP3 Fastigheter	Large Cap
Brinova Fastigheter	Mid Cap	Nyfosa	Large Cap
Castellum	Large Cap	Pandox	Large Cap
Catena	Large Cap	Platzer Fastigheter	Large Cap
Cibus Nordic	Mid Cap	Sagax	Large Cap
Corem	Large Cap	Samhällsbyggnadsbolaget i Norden (SBB)	Large Cap
Diös Fastigheter	Mid Cap	Stendörren Fastigheter	Mid Cap
Fabege	Large Cap	Trianon	Mid Cap
Fastpartner	Large Cap	Wallenstam	Large Cap
Heba Fastigheter	Mid Cap	Wihlborgs Fastigheter	Large Cap

For each company in the dataset, financial information for the period 2010-2020 was downloaded from Capital IQ on a quarterly basis. The financial information includes balance sheets, income statements, cash flow statements, historical capitalization, historical share price and trading volume development, and insider & strategic ownership. For each quarter, market-based data was retrieved from Konjunkturinstitutet to reflect the noise trader sentiment. Then, the software tools Excel and STATA were used to conduct the regression analysis and produce all charts and tables throughout the report.

3.1.1. Definition of variables

In the following section, the variables in the regression are divided into three groups. First, we present the dependent variable. Then, we present a series of firm-specific variables. Lastly, we present the variables that are used as a proxy for the noise trader sentiment. The definition of variables has been influenced by the previous research

regarding REITs and property companies outside of Sweden as outlined in the literature review.

3.1.1.1 Dependent variable

The premium or discount (NAVPREM) of property companies, which is the dependent variable in the regression, is calculated as market capitalization minus NAV divided by NAV. When NAVPREM > 0, it implies that the company trades at a premium, whereas the opposite implies a discount.

To reflect the premium or discount, the EPRA NAV formula by the European public real estate association (2016) has been applied. The rationale for applying EPRA NAV is that it provides a long-term and fair measurement of a property company's value, as it adds back items such as deferred tax and derivatives that are not expected to crystallize during normal circumstances.

Based on this, the NAV per quarter for each company was calculated by taking total equity, adding derivatives and deferred tax liabilities and subtracting deferred tax assets from the balance sheet. The market capitalization per quarter was retrieved by matching the closing market capitalization of each company with the publishing date of each quarterly report, as found in the historical capitalization. The NAVPREM variable was then calculated as specified in table 2.

Table 2. Table with dependent variable

Dependent variable	**Variable formula**
$NAVPREM_{it}$	$\frac{(Market\ Capitalization_{i,t} - EPRA\ NAV_{i,t})}{EPRA\ NAV_{i,t}}$

3.1.1.2 Rational firm-specific independent variables

In total, nine firm-specific variables have been applied to the regression that are hypothesized to have an impact on the dependent variable.

SIZE: Size was defined as the natural logarithm of the book value of total assets which was obtained from the quarterly balance sheet for each company. The natural logarithm

was applied to reduce the scale of the values used in the regression. Based on the works of previous researchers, we hypothesize that size will be positively correlated with the dependent variable.

DEBT: The debt ratio was defined as the ratio of the book value of total interest-bearing liabilities to total assets and measures the level of financial risk to which a company is exposed. Total debt and total assets were retrieved from the quarterly balance sheet for each company. The effect of increasing leverage is ambiguous as it on the one side boosts shareholder return, but on the other side increases the default risk. The impact of debt is diverging in the existing literature, where some papers have found that it is positively correlated with a premium to NAV while other papers found that it was negatively correlated. Hence, the expectation about the impact of the debt ratio is uncertain.

FFOg: An extensive literature search suggests that no previous papers have tested the impact of growth in funds from operations (FFO). The FFOg for each quarter was calculated by taking net income, adding back depreciation and amortization, and amortization of goodwill and intangibles, then subtracting interest and investment income, gain (loss) on sale of assets and gain (loss) on sale of investments during the last twelve months (LTM) from the income statement. The FFO growth was then calculated as specified in Table 2 by dividing it by the equivalent FFO value four quarters back. Previous researchers have however tested other performance-based ratios, such as ROE, and found that it has been positively correlated with NAV premium. Hence, the expectation is that growth in FFO will be rewarded with a higher valuation compared to NAV and thus be positively correlated with the dependent variable.

LIQ: As a proxy for liquidity, we used the total SEK volume per quarter. This data was calculated in Excel by summing up the daily share price multiplied by the daily volume for each trading day in each quarter. The SEK volume was also manipulated by taking its natural logarithm. The SEK volume was obtained through the charting function in Capital IQ, for the metrics share pricing and volume during the relevant time period. Consistent with most previous research, the expectation is that higher liquidity is rewarded by investors as liquidity is assumed to be one of the main advantages of

investing in the public property market compared to the direct property market. Hence, the expectation is that liquidity will be positively correlated with NAVPREM.

DIV: Dividend yield is derived by dividing the dividend paid to shareholders throughout the last twelve months by the market capitalization on the day when the quarterly report was published. Despite that previous research has shown contradicting results, most studies suggest that a higher dividend increases the valuation compared to NAV as investors value this source of return. Hence, the correlation is expected to be positive.

REP: Management's reputation is defined as the market capitalization development between the last quarter compared to the preceding year. Similar to NAVPREM, the closing market capitalization was matched with the date when the previous quarterly report was disclosed, and then compared to the market capitalization of the date when the quarterly report four quarters ago was published, to calculate the growth in market capitalization during this period. Several researchers have used this variable as a proxy for the reputation of a property company's management, assuming that the premium would be higher for companies that have demonstrated the ability to deliver superior shareholder returns. Similar to the literature review, the expectation is that a strong management's reputation will increase NAVPREM.

EXP: The Expense Ratio variable was obtained by taking property expenses, selling, general & administrative expenses and other operating expenses and dividing the sum of these by total revenue for each quarter. All variables are found in the income statement. In conformance with existing literature, the expectation is that a more efficiently managed company will achieve a lower expense ratio and thus achieve a higher valuation compared to NAV. Hence, the correlation with the dependent variable is expected to be negative.

OWN: The share of insider and strategic ownership was calculated by summing up the number of shares owned by insider and strategic owners according to Capital IQ and dividing this by the total number of common shares outstanding. Some researchers have found that increased insider ownership can reduce agency costs and align interest between shareholders and management which increases the premium to NAV. Other researchers, however, have concluded that it reduces the liquidity of the stock which

lowers the premium. Therefore, the expectation of the impact of ownership on valuation compared to NAV is uncertain.

VOL: The volatility per quarter was obtained by calculating the standard deviation of the daily share price return for each quarter. The daily share price return was calculated by dividing the change in share price in absolute terms from day t-1 to day t by the share price during day t-1. Similar to previous papers, the expectation is that a higher share price volatility will lead to a lower premium (or higher discount) to NAV as it captures investors' risk aversion. Hence, the expected correlation with the dependent variable is negative.

All firm-specific data has been retrieved from Capital IQ.

Table 3. Table with rational firm-specific independent variable

Independent Variable	**Variable Formula**	**Expected Correlation**
$SIZE_{it}$	ln $(Book\ Value\ of\ Assets_{i,t})$	+
$DEBT_{it}$	$\frac{Book\ Value\ of\ Debt_{i,t}}{Book\ Value\ of\ Assets_{i,t}}$	+/-
$FFOg_{it}$	$\frac{FFO_{i,t}}{FFO_{i,t-4}}$	+
LIQ_{it}	ln $(\sum_{d=0,d\ in\ t}^{n} Closing\ Share\ Price_{i,d} * Traded\ Volume_{i,d})$	+
DIV_{it}	$\frac{\sum_{m=0,m\ in\ t}^{12} Dividend\ paid_{i,m}}{Market\ capitalization_{i,t}}$	+
REP_{it}	$\frac{Market\ Capitalization_{i,t-1}}{Market\ Capitalization_{i,t-4}}$	+
EXP_{it}	$\frac{(Property\ Expenses_{i,t} + SG\&A_{i,t} + Other\ Operating\ Expenses_{i,t})}{Total\ Revenue_{i,t}}$	-
OWN_{it}	$\frac{(Shares\ held\ by\ strategic\ owners_{i,t} + Shares\ held\ by\ insiders_{i,t})}{Fully\ Diluted\ Shares\ Outstanding_{i,t}}$	+/-
VOL_{it}	$\sqrt{\frac{1}{n-1} * \sum_{d=0,d\ in\ t}^{n} (Daily\ returns_{i,d} - \overline{Daily\ returns_{i,t}})}$	-

3.1.1.3 Behavioral independent variables

As previously outlined, there are two types of stock market participants: rational and irrational. The nine aforementioned variables are expected to capture fundamental drivers of premiums and discounts to NAV that rational market participants incorporate in investment decisions. The forthcoming variables, however, are expected to capture market-wide changes in the noise trader sentiment. Following Barkham and Ward's

(1999) research structure for property companies in the UK, a business confidence index (BCI), a customer confidence index (CCI), and an index of inflation expectation, as well as actual inflation have been included to capture the changes in the noise trader sentiment.

BCI: The BCI variable was calculated by using Konjunkturinstitutet's "Anläggningsverksamhet (SNI 42)" (Construction activities) indicator. The survey includes monthly responses. In our dataset, we have included the final survey responses for each quarter, so that e.g., the response included for Q1 2011 is the survey response for March 2011. This indicator includes survey responses regarding backlogs, an assessment of the current business environment and the current number of employees, as well as expectations for the upcoming twelve months. This sector was chosen because the construction industry is closely related to the activities of property companies and is thus assumed to capture the sentiment for property companies as well. The expectation is that the correlation with NAVPREM will be positive.

CCI: The CCI variable was calculated by using Konjunkturinstitutet's "Mikroindex Hushåll" (Micro index households) indicator. This indicator includes an average of survey responses regarding households' current economic status and their thoughts on how attractive capital investments currently are as well as if they will increase capital investments in the coming twelve months. Like the BCI indicator, the survey responses are monthly, and in our dataset, we included the latest survey response for each quarter. Similar to the expectations for the BCI index, we expect NAVPREM to increase when consumers are optimistic.

Lastly, two measures of inflation have been included.

INFLEX: The inflation expectation was retrieved from Konjunkturinstitutet's "Förväntad inflation om 12 månader" (expected inflation in 12 months) index which is a survey-based indicator of households' median inflation expectations. As this variable is forward-looking and focuses on future expectations, it is assumed to provide a useful proxy for the noise trader sentiment. The expectation is that the variable will be negatively correlated with NAVPREM. This hypothesis reflects that an increase in inflation tends to increase the anticipation of rising interest rates which affects the highly indebted property companies' profitability through increased interest expenses.

INFLAC: Lastly, the actual inflation was calculated using "uppfattad inflation nu" (Perceived inflation now) indicator which was obtained from Konjunkturinstitutet. This variable was included to further understand how inflation affects the NAVPREM variable. As both the INFLEX and INFLAC variable is monthly based, we used the latest survey response for each quarter. Similar to INFLEX, we expect the correlation with NAVPREM to be negative.

Table 4. Table with behavioral noise trader sentiment variables

Independent Variable	Variable Formula	Expected Correlation
BCI_{it}	$BCI\ Index_{i,t}$	+
CCI_{it}	$CCI\ Index_{i,t}$	+
$INFLEX_{it}$	$Expected\ Inflation\ index_{i,t}$	-
$INFLAC_{it}$	$Actual\ Inflation\ index_{i,t}$	-

3.2. Regression Model

In order to empirically assess the changes in NAVPREM for the property companies in our data sample, we set up three separate regression models. Our first model is a baseline regression model and our second and third regression models are both fixed effects models. The variables included in the three models are described above, and the different regression models include different combinations of these variables.

3.2.1. Model 1 – Baseline regression model

Our first model is a baseline regression model, which includes all the firm-specific variables described above as well as the noise trader sentiment variables. These variables are intended to reflect the noise trader sentiment during different quarters and is a way to test if behavioral biases affect valuation relative to NAV.

$$NAVPREM_{it} = \beta_0 + \beta_1 SIZE_{1,it} + \beta_2 DEBT_{2,it} + \beta_3 FFOg_{3,it} + \beta_4 LIQ_{4,it} + \beta_5 DIV_{5,it} + \beta_6 REP_{6,it} + \beta_7 EXP_{7,it} + \beta_8 OWN_{8,it} + \beta_9 VOL_{9,it} + \beta_{10} BCI_{10,it} + \beta_{11} CCI_{11,it} + \beta_{12} INFLEX_{12,it} + \beta_{13} INFLAC_{13,it} + u_{it}$$

For each independent variable in the equation above, as well as the constant, the corresponding coefficient is given by the $\boldsymbol{\beta}$-signs. For each variable, i represents the property company and t represents the quarter. The error term is given by u_{it}.

3.2.2. Model 2 – Quarter fixed effects model

Model 2 is a fixed effects model using quarter fixed effects. As we use panel data in our analysis, using a fixed effects model enables us to consider differences between quarters that would not otherwise be captured, therefore potentially avoiding omitted variable bias. As we believe valuations may be driven by variations in market sentiment, which varies with time, it is reasonable to include quarter fixed effects.

$$NAVPREM_{it} = \beta_0 + \beta_1 SIZE_{1,it} + \beta_2 DEBT_{2,it} + \beta_3 FFOg_{3,it} + \beta_4 LIQ_{4,it} + \beta_5 DIV_{5,it} + \beta_6 REP_{6,it} + \beta_7 EXP_{7,it} + \beta_8 OWN_{8,it} + \beta_9 VOL_{9,it} + \sigma_t + u_{it}$$

As we have quarter fixed effects in this model, σ_t represents the dummy variables for each quarter.

By including time fixed effects instead of the noise trader sentiment variables as in Model 1, we capture the impact of market sentiment in a different way. The inclusion of quarter fixed effects instead of noise trader sentiment is likely to yield a higher R-squared value, as quarter fixed effects will incorporate the total impact of market sentiment on valuation relative to NAV during specific time periods, whereas the noise trader variables may not be able to do so.

3.2.3. Model 3 – Quarter and company fixed effects model

Model 3 includes firm-specific characteristics, time fixed effects, and company fixed effects. As different property companies' identities are time-invariant, and this identity may influence a company's valuation relative to NAV, including company fixed effects

is logical in our case. This is possible if we assume that the effects on valuation relative to NAV are also time-invariant.

$$NAVPREM_{it} = \beta_0 + \beta_1 SIZE_{1,it} + \beta_2 DEBT_{2,it} + \beta_3 FFOg_{3,it} + \beta_4 LIQ_{4,it} + \beta_5 DIV_{5,it} + \beta_6 REP_{6,it} + \beta_7 EXP_{7,it} + \beta_8 OWN_{8,it} + \beta_9 VOL_{9,it} + \sigma_t + \sigma_i + u_{it}$$

As we have firm fixed effects in this model, σ_i represents the dummy variables for each firm.

By including firm fixed effects, the interpretation of the coefficients of the independent variables will differ compared to models 1 and 2. As we are controlling for the effect of data points belonging to different companies in model 3, the proper interpretation here relates to how changes in the independent variables can explain the change in the premium or discount of a specific firm over time. In models 1 and 2, the interpretation is more related to how differences in the independent variables may explain the difference in the premium or discount between firms.

3.2.4. Premium and discount companies

To further develop the analysis, the three regression models were applied to two additional data sets, one for premium companies and one for discount companies. The 22 companies in the dataset were split into premium or discount companies based on if their average NAVPREM value during the observed time period was positive or negative. The premium companies in the dataset are shown in table 9 and the discount companies are shown in table 10 in the appendix.

3.3. Summary statistics

In the following table, the descriptive statistics for all variables are outlined.

The dataset includes 632 datapoints for each variable, based on data from 22 companies during a total of 40 quarters between 2011 to 2020. All firm-specific variables were winsorized in Stata at the 1%-level, to reduce the impact of outliers on the regression results.

Table 5. Variable statistics

Variable	Mean (n=632)	Std. Dev (n=632)	Min (n=632)	Max (n=632)
NAVPREM	.02	.23	-.40	.83
SIZE	30 319.93	27 386.24	3 000.10	180 401.00
DEBT	.51	.12	.17	.73
FFOg	.45	1.12	-.92	6.23
LIQ	1 305.08	2 080.09	0	16 152.99
DIV	.03	.02	0	.07
REP	.17	.22	-.31	.92
EXP	.36	.09	.18	.58
OWN	.45	.22	.03	.87
VOL	.02	.01	.01	.05
BCI	102.72	6.54	86	117.8
CCI	98.12	5.61	83.30	106
INFLEX	1.46	.47	.6	2.4
INFLAC	1.11	.96	-.6	3.2
CompID	11.26	6.64	1	22
QuarterID	23.08	11.48	1	40
log Size	9.98	.84	8.29	11.86
log LiqSEK	5.84	1.97	1.03	9.22

4. Results and discussion

This section presents the outcome of the regressions applied in this paper. First, the results of the regressions are presented. Then, the empirical findings are analyzed and discussed based on the existing literature.

4.1. Regression model

In this section, three tables are presented. In table 6, the coefficients and standard errors are presented for the dataset that includes all companies. In model 1, we ran an OLS panel regression on all firm-specific and noise trader sentiment variables outlined in the data and methodology section and obtained an R-squared of 0.249. In model 2, the noise trader sentiment variables were excluded, and quarter fixed effects were added, leading to an R-squared of 0.354. In model 3, in addition to quarter fixed effects, we also added company fixed effects to the model, which increased the R-squared to 0.681. Furthermore, in tables 7 and 8, two additional regression tables are presented where we ran the same tests on the datasets that include companies that on average have traded at a premium and discount (the companies that are included in these two datasets can be found in tables 9 and 10 in the appendix). For all regressions, standard errors are clustered at the company level.

Table 6. Regression results for all companies

VARIABLES	Model 1	Model 2 NAVPREM	Model 3
SIZE	0.074	0.092	0.086
	(0.063)	(0.063)	(0.098)
DEBT	0.104	0.108	-0.254
	(0.187)	(0.168)	(0.478)
FFOg	0.001	-0.005	0.002
	(0.008)	(0.011)	(0.008)
LIQ	-0.041	-0.053	-0.025
	(0.036)	(0.035)	(0.018)
DIV	-3.854	-3.084	-2.261*
	(2.344)	(2.682)	(1.196)
REP	0.131*	0.108	0.152**
	(0.074)	(0.091)	(0.0561)
EXP	-0.463	-0.435	0.301
	(0.387)	(0.381)	(0.435)
OWN	0.013	-0.009	-0.0293
	(0.094)	(0.089)	(0.116)
VOL	-4.527**	-7.785**	-2.846
	(2.176)	(3.483)	(1.925)
BCI	0.005***	-	-
	(0.001)	-	-
CCI	0.002	-	-
	(0.003)	-	-
INFLEX	0.046	-	-
	(0.036)	-	-
INFLAC	-0.078***	-	-
	(0.016)	-	-
Constant	-0.867	-0.292	-0.576
	(0.669)	(0.464)	(0.959)
Observations	632	632	632
R-squared	0.249	0.354	0.681
Adj R-squared	0.233	0.301	0.641
Within R-squared	0.249	0.187	0.111

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7. Regression results for premium companies

VARIABLES	Model 1	Model 2 NAVPREM	Model 3
SIZE	0.107**	0.140*	0.130
	(0.042)	(0.068)	(0.253)
DEBT	0.246	-0.017	-0.559
	(0.524)	(0.514)	(0.670)
FFOg	0.006	0.007	0.0052
	(0.004)	(0.008)	(0.013)
LIQ	-0.058*	-0.078*	-0.051**
	(0.027)	(0.036)	(0.023)
DIV	-4.196*	0.329	-1.545
	(2.261)	(1.977)	(1.922)
REP	0.285***	0.366***	0.300**
	(0.056)	(0.109)	(0.098)
EXP	-0.311	-0.078	0.834
	(0.266)	(0.310)	(0.799)
OWN	0.054	0.019	-0.204
	(0.138)	(0.191)	(0.393)
VOL	-0.970	-1.116	-1.512
	(1.582)	(3.278)	(4.263)
BCI	0.001	-	-
	(0.003)	-	-
CCI	-0.009**	-	-
	(0.004)	-	-
INFLEX	0.060	-	-
	(0.050)	-	-
INFLAC	-0.059***	-	-
	(0.013)	-	-
Constant	0.187	-0.835	-0.742
	(0.821)	(0.729)	(2.686)
Observations	303	303	303
R-squared	0.460	0.562	0.651
Adj R-squared	0.436	0.480	0.567
Within R-squared	0.460	0.417	0.168

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8. Regression results for discount companies

VARIABLES	Model 1	Model 2	Model 3
		NAVPREM	
SIZE	-0.007	0.010	0.088
	(0.029)	(0.025)	(0.073)
DEBT	-0.152*	-0.130*	-0.110
	(0.082)	(0.064)	(0.350)
FFOg	0.006	-0.004	-0.009
	(0.006)	(0.006)	(0.006)
LIQ	0.009	-0.003	-0.012
	(0.015)	(0.012)	(0.009)
DIV	-2.167***	-1.945**	-2.385*
	(0.555)	(0.676)	(1.245)
REP	0.089	0.0485	0.076
	(0.051)	(0.057)	(0.056)
EXP	0.091	0.099	-0.852
	(0.183)	(0.216)	(0.844)
OWN	-0.121**	-0.146**	-0.000
	(0.054)	(0.054)	(0.108)
VOL	-4.213*	-6.370**	-2.612
	(2.032)	(2.555)	(1.811)
BCI	0.001	-	-
	(0.001)	-	-
CCI	-0.002	-	-
	(0.002)	-	-
INFLEX	0.004	-	-
	(0.020)	-	-
INFLAC	-0.044***	-	-
	(0.011)	-	-
Constant	0.275	0.069	-0.420
	(0.389)	(0.220)	(0.713)
Observations	329	329	329
R-squared	0.325	0.544	0.609
Adj R-squared	0.297	0.466	0.523
Within R-squared	0.325	0.318	0.141

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Chart 1. NAVPREM development – all companies

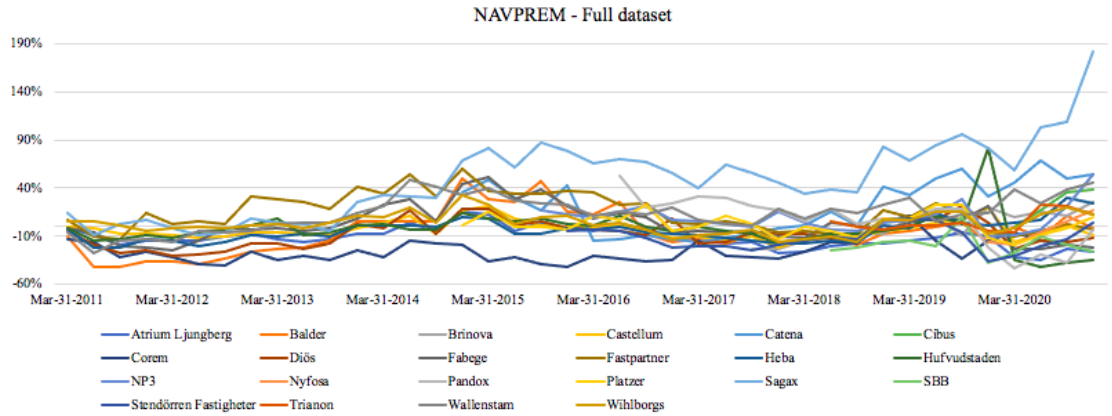
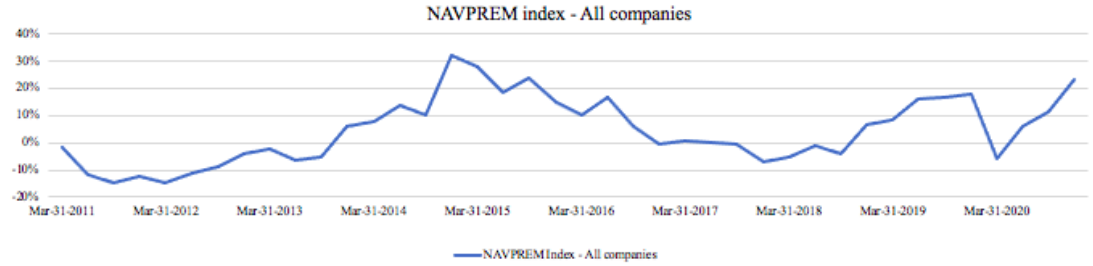


Chart 2. NAVPREM index – all companies[2]



[2] Weighted average NAVPREM index by quarterly market capitalization

4.2. Statistical interpretation – rational firm-specific variables

The size variable is not statistically significant in the dataset with all companies, but the expected signs are positive in all the models. However, it is statistically significant at the 5% and 10% levels respectively in models 1 and 2 for premium companies. These results imply that the variable is positively correlated with NAVPREM, suggesting that larger firms benefit from size, which confirms our hypothesis. Also, as the variable is only statistically significant in the premium company dataset, it implies that size mainly drives a premium to NAV in the presence of other factors that also drive NAVPREM. As the variable is significant for models 1 and 2, but not 3, this may suggest that the relative size between companies is more significant than the absolute size of each company. We find that previous papers support our findings. The results are also consistent with the conclusions of Anderson et al (2001) who argued that a size premium exists as a result of better access to capital markets and economies of scale as well as with the conclusions of Capozza and Korean (1995) and Clayton and MacKinnon (2000). The results could also be explained by Adams and Venmore-Rowland (1990) who suggested that larger companies face less competition in auctions for high-price properties as there are fewer parties that have the financial resources to acquire these buildings. For that reason, a higher ROI can be achieved on these properties which implies that large firms that have the resources to acquire these properties should be valued higher than smaller firms that lack this opportunity. However, our results do not support the conclusion of Barkham and Ward (1999) who suggested that a big property company that was about to divest its property portfolio would face illiquidity in the direct property market. For that reason, the company would be forced to divest its properties at a price lower than NAV, thereby suggesting that size is negatively correlated with NAVPREM. A potential explanation is that property companies rarely divest a significant part of their property portfolio simultaneously whereas market participants do not account for this possibility when investing.

The empirical analysis does not display a significant correlation between the debt ratio variable and the NAVPREM variable. However, in the dataset with discount companies, the variable is significant at the 10% level in models 1 and 2 with negative expected signs. This result in conjunction with the statistically insignificant results for REP for

discount companies suggests that investors may price an inability of the management of these companies to generate superior ROI, and mainly view an increase in the debt ratio as additional financial risk. Since the conclusions among previous papers have differed a lot, this result is not unexpected. On the one hand, Clayton and MacKinnon (2000) and Barber (1996) argued that the use of debt induces discipline in management which thereby reduces agency cost which implies that the correlation should be positive. On the other hand, Anderson et al (2001) suggested that the correlation is negative because the increased use of leverage reduces management's flexibility and increases the risk exposure as well as sensitivity to changes in market conditions and interest rates, which corresponds to Ke's results (2015). All property companies in the dataset, to a varying extent, lever their property acquisitions to increase returns. A probable explanation for why it was not significant when including all companies is that debt initially increases NAVPREM until a certain level where investors shift focuses from increasing returns to aversion of financial risk. From that level, additional leverage would lower the valuation to NAV as the downside starts outweighing the upside, implying that there is an equilibrium debt ratio level to maximize the company's valuation. This conclusion is consistent with Adams and Venmore-Rowland (1990) who argued that leverage could be a potential source of both a premium and a discount depending on the market sentiment.

The results do not support a strong correlation between FFOg and NAVPREM as the variable is not statistically significant in any of the models. Our expectation was that property companies that manage to achieve high growth in FFO over time would have higher NAV premiums (or lower NAV discounts). However, the results did not conform with previous studies that have used other performance-based metrics (e.g., ROE) when assessing sources of discounts and premiums to NAV (Morri et al, 2005; Adams and Venmore-Rowland, 1990). As the expected sign was positive in most models, it implies the same relationship as we expected. However, given the lack of significant results, the strengths of the relationship appear limited.

The liquidity variable is not statistically significant and displays a negative expected sign in all models (with an exception for model 1 with discount companies) which contradicts our hypothesis. Notably, it is even statistically significant at 10% in models 1 and 2 and at 5% in model 3 for premium companies, implying a negative correlation

with NAVPREM. Several previous papers have reached contradicting conclusions and have provided robust evidence that liquidity, all else equal, increases market capitalization and thus the NAV premium (Benveniste et al, 2001; Adams and Venmore-Rowland, 1990; Capozza and Seguin, 1999, Clayton and Mackinnon, 2000; Ke, 2015, Brounen and Laak, 2005). Brounen et al (2013) however, found the same results as we obtained as illiquidity appeared to be rewarded in their paper. However, they did not analyze or comment on that result. We provide three plausible explanations for this result. One potential interpretation of the results is that liquidity is a function of discount, where stock market participants allocate capital to companies that trade at a discount to pursue investment opportunities. However, this suggestion seems improbable as it should imply a positive correlation between liquidity and NAVPREM for discount companies which the results do not confirm. It may also be the case that property companies with liquid shares have a lower cost of capital (i.e., discount rate). That would enable these companies to invest in properties with a lower expected rate of return while still yielding a positive net present value (NPV). As this would reduce the return metrics, it is intuitive that the correlation with NAVPREM should be negative. Lastly, the possibility cannot be excluded that the unexpected results are a consequence of a model misspecification rather than a new empirical finding.

Furthermore, we observe that the dividend yield variable is statistically significant at the 10% level in model 3 with a negative expected sign. For discount companies, it is also statistically significant at the 1%, 5%, and 10% levels in models 1 to 3 respectively. It is also statistically significant for premium companies at the 10% level in model 1. This contradicts our initial hypothesis but is not completely unexpected as previous researchers have reached contradicting conclusions with regards to the impact on NAVPREM of dividend yield. The negative correlation sign in some of the models might imply that investors prefer to have the profit reinvested, as Morri and Benedetto (2009) suggested. However, contrary findings have been made by Gemmill and Thomas (2002) who suggested that a higher dividend yield translates into a greater premium (or lower discount). Adams and Venmore-Rowland (1990) reached the same conclusion as Gemmill and Thomas but suggested that market participants' preferences for dividends have shifted historically, thereby suggesting that its impact on a property company’s valuation is time variant. Furthermore, Adams and Venmore-Rowland (1990) point out

that while some investors consider earnings and dividends in their investment decisions, others interpret it as a sign of limited growth opportunities and therefore tend to allocate capital to stocks with low dividend yields to exploit these. Furthermore, a second explanation for why the variable is negatively correlated in all the models could be because the dividend yield is a function of market capitalization. Dividends are accumulated over the last twelve months while the market capitalization is based on the worth of the company on the same day as the most recent quarterly or annual report is disclosed. Keeping the dividend paid to shareholders constant, the dividend yield ratio may be affected by other factors that alter the market capitalization. This would explain why the negative correlation is weaker for premium companies, as shown in the strong positive relationship between NAVPREM and REP for premium companies, where the latter tracks the development of the market capitalization.

The preceding year's stock return, used as a proxy for management's reputation, is positively correlated with NAVPREM and statistically significant at the 10% level in model 1 and 5% in model 3. The variable is also statistically significant at the 1% levels in models 1 and 2 and 5% in model 3 in the regressions for premium companies. However, it is not statistically significant in any of the models for discount companies. This indicates that the market values companies with management teams that are well-renowned and that these are rewarded with premium valuations. These results confirm the previously stated hypothesis and conform with the conclusions of several previous papers that suggested that the management team plays a crucial role in determining the value of a property company. This characteristic is not unique to Swedish companies, as Brounen and Laak (2005) and Morri et al (2005) have documented that strongly performing companies tend to be priced optimistically and achieve a higher valuation to NAV. Corresponding results have also been found by Malkiel (1995), Ke (2015), Barkham and Ward (1999), and Adams and Venmore-Rowland (1990).

The expense ratio variable is not statistically significant when including all companies in the dataset nor in the datasets with premium and discount companies. This contradicts our hypothesis as the correlation was expected to be negative. As a well-managed property company with good cost control will achieve a lower expense ratio which increase shareholder return, a negative correlation as we expected would have been consistent with the conclusions of previous research (Adams and Venmore-

Rowland, 1990). This hypothesis was also based on the assumption that a high expense ratio implies agency costs which can constitute a significant cost for shareholders (Gemmill and Thomas, 2002). Given the varying expected signs among the models, the explanatory power of the variable is weak and its impact on NAVPREM appears to be limited. This could potentially be explained by Gemmill and Thomas (2002). They suggested that the standalone impact of a high expense ratio is negative but that it can be offset by a superior performance in other areas which compensate for the impact of a higher expense ratio, which could explain the results. A second potential explanation is that the valuation mainly is affected by the changes in the reported value of the property portfolio (Asset write-up and Asset write-down) compared to changes in operating expenditure. As value appreciation (i.e., Asset write-up) of the property portfolio may affect the reported net profit and earnings per share significantly, such a conclusion is intuitively appealing. If that is the case, operating expenditure may have a non-significant impact on NAVPREM, which could explain the unexpected result.

The insider ownership variable is not statistically significant in any of the models in the dataset with all companies, but the expected signs suggest that the correlation is negative. Furthermore, it is statistically significant at the 5% levels in models 1 and 2 for discount companies. With regards to the contradicting conclusions of previous papers, this result is not unexpected. Barkham and Ward (1999) suggested that increased insider ownership aligns the interest of the shareholders and the management, which implies a positive correlation as agency costs decrease. These results have been confirmed in several research papers (Morri et al, 2005; Morri and Benedetto, 2009, Capozza and Seguin, 2003). Ke (2015), on the contrary, provided evidence that shares with a high degree of insider ownership exhibit lower liquidity which decreases the value compared to NAV. Furthermore, Malkiel (1995) suggested that a high level of insider ownership particularly affects CEFs that trade at a discount to NAV because the probability that the management decides to redeem the fund's assets at NAV, which potentially could benefit the shareholders, is reduced which expands the discount to NAV. As the negative correlation was stronger for discount companies than premium companies, the conclusion of Malkiel (1995) seems probable.

The volatility variable, defined as volatility in daily share returns in the preceding quarter, is negatively correlated and statistically significant at the 5% level in models 1

and 2. It is also statistically significant at the 10% and 5% level respectively in models 1 and 2 for discount companies. As volatility is negatively correlated with NAVPREM, the results suggest that increased stock volatility lowers the premium to NAV reflecting risk aversion among investors. This result is in line with our hypothesis as increased volatility increases an investor's risk premium for holding a property company share, which thereby reduces its share price. This result also reflects that the equity market is more volatile than the direct property market. Equivalent results have been obtained for European property stocks (Ke, 2015, Morri et al, 2005; Adams and Venmore-Rowland, 1990) and REITs (Clayton and MacKinnon, 2000).

4.3. Statistical interpretation – behavioral variables

The purpose of empirically assessing these variables is to observe indicators and understand the formation of the noise trader sentiment. The interpretation of the BCI, CCI, and expected inflation results should not be that these variables cause the NAVPREM to change. Instead, they are seen as indicators of the noise trader sentiment which can drive both a premium and discount to NAV as displayed in the literature review.

The BCI variable is statistically significant at the 1% level and is positively correlated with NAVPREM which confirms the hypothesis. Hence, when businesses and enterprises are optimistic about their future outlooks, it tends to coincide with when the valuation of property companies is relatively high in relation to NAV as noise traders are optimistic. The CCI variable had the same expected sign as the BCI variable but was not statistically significant. Hence, the strength of the correlation was lower than for the BCI index, even though the expected sign implies the same conclusion.

Observing the results for the expected inflation, we obtained an unexpected result where the correlation was positive, implying that increased inflation expectations lead to an increase in the premium, even though the result was not statistically significant. This contradicts our hypothesis that expected inflation implies increased interest rates which intuitively should imply lower valuations relative to NAV as interest expenses of variable-rate debt financing increase. A potential explanation for this result is that inflation is inherently difficult to estimate twelve months into the future. For this reason,

it is legitimate to believe that market participants pay more attention to the actual inflation compared to their own expectations of future inflation, which is very difficult to assess ex-ante. Such a conclusion is intuitive as central banks' monetary policies are more prone to act following changes in the actual inflation compared to forecasts. This conclusion is supported by the actual inflation variable which exhibits a robust negative correlation with NAVPREM and is statistically significant at the 1% level, which corresponds to the previously stated hypothesis.

5. Conclusion

This paper has empirically assessed the factors that drive the valuation of listed Swedish property companies and affects their market capitalization compared to NAV. Three regression models were applied to test the impact of both rational and behavioral variables that were assumed to affect the NAV premium on a cross-sectional dataset from 2011 to 2020 that includes 22 Swedish listed property companies.

The first hypothesis tested was how a series of firm-specific factors affect the valuation compared to NAV. Similar to previous papers that have researched other geographical markets, it is evident that factors such as size, debt ratio, management's reputation, and volatility significantly affect the NAVPREM variable. Furthermore, the BCI index and actual inflation variables were also statistically significant, implying that the noise trader sentiment also contributes to the deviations of property companies' market capitalization from NAV. The high R-squared figure for model 3 indicates that quarter-specific and company-specific factors explain a significant amount of the variation in the NAVPREM variable. However, what these factors might be more specifically is not explained by our regression model. While the firm-specific and noise trader variables show some significance in our models, there must be additional variables that are not included in our regressions which explain the remaining variations in the NAVPREM variable. Furthermore, while quarter fixed and company fixed effects explain a large portion of the variation between companies and over time, the low within R-squared figure for model 3 indicates that the included firm-specific variables are unable to explain most of the variation within companies.

There are several implications of these findings. Firstly, we have provided evidence that several of the factors that have been found to have an impact on the NAV premium and discount in REITs and European property companies also applies to Swedish property companies. Secondly, this paper has provided further evidence that there are both rational and behavioral drivers that explain the deviations between market capitalization and NAV. Thirdly, this paper has furthered the understanding of what drives NAV premium and discount for different companies by applying the regressions to sets of premium and discount companies, respectively, to analyze how these may differ. This is

particularly interesting as we are testing the independent variables in an environment where many companies have traded at substantial premiums for a significant period of time, which was uncommon when researchers began studying the closed-end fund puzzle. By observing the results for each dataset, it is evident that the variables affect premium and discount companies differently. For premium companies, size seems to amplify the premium in the presence of other factors that also correlates positively with NAVPREM. However, in the discount company dataset, the discount to NAV was widened by increases in the debt ratio and insider ownership. Lastly, considering the high explanatory power in the regressions when using quarter and company fixed effects, it seems like there are still additional factors that were unaccounted for in the model. By further exploring and adding more variables, it could potentially further explain variations in the NAV premium and discount, including why the companies in the premium and discount datasets were valued differently.

Therefore, for further research, we recommend adding additional independent variables to the model. Such variables could for instance the impact of inclusions and exclusions in stock indexes and mergers and acquisitions (M&A) activity on NAVPREM. An additional factor that was unaccounted for in this paper was the benefits of operating a focused versus a diversified property portfolio. The benefit of diversification is intuitive as it lowers risk by reducing exposure both to specific geographies (e.g., a specific city or a region) and to specific industries (e.g., logistics or retail). A higher degree of focus, however, could potentially let the management team utilize their knowledge and skills within certain niches and therefore generate a superior shareholder return. Therefore, it would be interesting to understand how these factors interplay in valuation.

References

Adams, A., & Venmore-Rowland, P. (1990). Property share valuation. *Journal of Valuation*, 8(2), pp. 127-142.

Amihud, Y., & Mendelson, H. (1987). Trading mechanisms and stock returns: An empirical investigation. *The Journal of Finance*, 42(3), pp. 533-553.

Anderson, R., Conner, P., & Liang, Y. (2001). Dimensions of REIT Pricing: Size, Growth, and Leverage. *Prudential Real Estate Investors*, Newark, NJ.

Barber, B. M. (1996). Forecasting the discounts of market prices from appraised values for real estate limited partnerships. *Real Estate Economics*, 24(4), pp. 471-491.

Barkham, R., & Ward, C. (1999). Investor sentiment and noise traders: Discount to net asset value in listed property companies in the UK. *Journal of Real Estate Research*, 18(2), pp. 291-312.

Benveniste, L., Capozza, D. R., & Seguin, P. J. (2001). The value of liquidity. *Real estate economics*, 29(4), pp. 633-660.

Bond, S., & Shilling, J. (2004). An evaluation of property company discounts in Europe. Unpublished working paper. *University of Cambridge.*

Brounen, D., & Laak, M. (2005). Understanding the discount: Evidence from European property shares. *Journal of real estate portfolio management*, 11(3), pp. 241-251.

Brounen, D., Ling, D. C., & Prado, M. P. (2013). Short sales and fundamental value: explaining the REIT premium to NAV. *Real Estate Economics*, 41(3), pp. 481-516.

Capozza, D.R., & Korean, S. (1995). Property type, size, and REIT value. *Journal of Real Estate Research*, 10(4), pp. 363-379.

Capozza, D. R., & Seguin, P. J. (1999). Focus, transparency and value: the REIT evidence. *Real Estate Economics*, 27(4), pp. 587-619.

Capozza, D. R., & Seguin, P. J. (2003). Inside ownership, risk sharing and Tobin's Q-ratios: Evidence from REITs. *Real Estate Economics*, 31(3), pp. 367-404.

Clayton, J., & MacKinnon, G. H. (2000). Explaining the discount to NAV in REIT pricing: Noise or Information?. Working paper. *University of Cincinnati*.

Cuthbertson, K., & Nitzsche, D. (2005). Quantitative financial economics: stocks, bonds and foreign exchange. *John Wiley & Sons.*

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1990). Noise trader risk in financial markets. *Journal of Political Economy*, 98(4), pp. 703-738.

Dowling, R. (2005). Residential building in Australia, 1993–2003. *Urban Policy and Research*, 23(4), pp. 447-464.

European Public Real Estate Association. (2016). Best practice recommendation guidelines. Retrieved from: Link

Gau, G. W. (1987). Efficient real estate markets: paradox or paradigm?. *Real Estate Economics*, 15(2), pp. 1-12.

Gemmill, G., & Thomas, D. C. (2002). Noise trading, costly arbitrage, and asset prices: Evidence from closed-end funds. *The Journal of Finance*, 57(6), pp. 2571-2594.

Gyourko, J., & Keim, D. B. (1992). What does the stock market tell us about real estate returns?. *Real Estate Economics*, 20(3), pp. 457-485.

Hoesli, M., & Oikarinen, E. (2012). Are REITs real estate? Evidence from international sector level data. *Journal of International Money and Finance*, 31(7), pp. 1823-1850.

Ingersoll Jr, J. E. (1976). A theoretical and empirical investigation of the dual purpose funds: An application of contingent-claims analysis. *Journal of Financial Economics*, 3(1-2), pp. 83-123.

Jackson, L.A. (2008). An examination and application of current lodging valuation practices. *Journal of Retail & Leisure Property*, 7(3), pp. 234-247.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American economic review*, 76(2), pp. 323-329.

Ke, Q. (2015). What affects the discount to net asset value in the UK-listed property companies?. *Journal of Property Research*, 32(3), pp. 240-257.

Kyle, A. S. (1985). Continuous auctions and insider trading. Econometrica: *Journal of the Econometric Society*, 53(6), pp. 1315-1335.

Lang, H. P., & Litzenberger, R. H. (1989). Cash flow signalling vs free cash flow hypothesis. *Journal of Financial Economics*, 24(1), pp. 181-191.

Lee, C. M., Shleifer, A., & Thaler, R. H. (1991). Investor sentiment and the closed-end fund puzzle. *The journal of finance*, 46(1), pp. 75-109.

Leskinen, N., Vimpari, J., & Junnila, S. (2020). A review of the impact of green building certification on the cash flows and values of commercial properties. *Sustainability*, 12(7), p. 2729.

Malkiel, B. G. (1977). The valuation of closed-end investment-company shares. The *Journal of Finance*, 32(3), pp. 847-859.

Malkiel, B. G. (1995). The structure of closed-end fund discounts revisited. *Journal of Portfolio Management*, 21(4), pp. 32-38.

Morri, G., & Benedetto, P. (2009). Leverage and NAV discount: evidence from Italian real estate investment funds. *Journal of European Real Estate Research*, 2(1), pp. 33-55.

Morri, G., McAllister, P., & Ward, C. (2005). Explaining deviations from NAV in UK property companies: rationality and sentimentality. Working Paper. *University of Reading*

Shleifer, A., & Vishny, R. W. (1990). Equilibrium short horizons of investors and firms. *The American Economic Review*, 80(2), pp. 148-153.

Yunus, N., Hansz, J. A., & Kennedy, P. J. (2012). Dynamic interactions between private and public real estate markets: Some international evidence. *The Journal of Real Estate Finance and Economics*, 45(4), pp. 1021-1040.

Appendix

Table 9. Table of premium companies in Dataset

Company	Nasdaq Exchange	Company	Nasdaq Exchange
Catena	Large Cap	Platzer Fastigheter	Large Cap
Cibus Nordic	Mid Cap	Sagax	Large Cap
Fabege	Large Cap	Trianon	Mid Cap
Fastpartner	Large Cap	Wallenstam	Large Cap
NP3 Fastigheter	Large Cap	Wihlborgs Fastigheter	Large Cap
Pandox	Large Cap		

Chart 3. NAVPREM development – premium companies

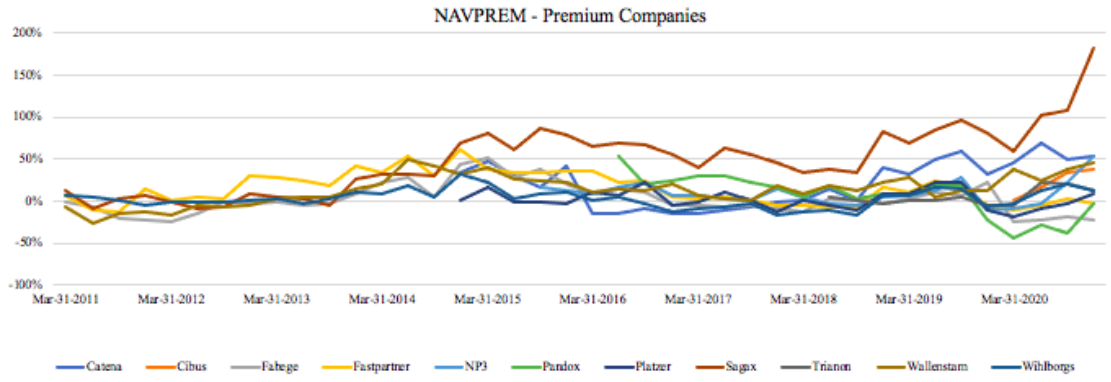


Chart 4. NAVPREM index – premium companies[3]

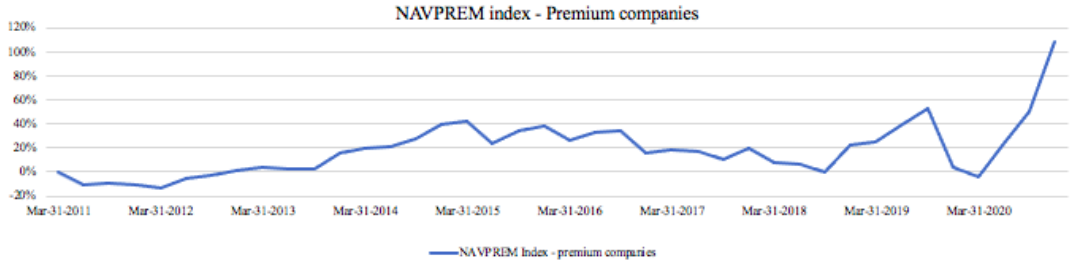


Table 10. Table of discount companies in Dataset

Company	Listing date	Company	Listing date
Atrium Ljungberg	Large Cap	Heba Fastigheter	Mid Cap
Balder	Large Cap	Hufvudstaden	Large Cap
Brinova Fastigheter	Mid Cap	Nyfosa	Large Cap
Castellum	Large Cap	Samhällsbyggnadsbo i Norden (SBB)	Large Cap
Corem	Large Cap	Stendörren Fastigheter	Mid Cap
Diös Fastigheter	Mid Cap		

[3] Weighted average NAVPREM index by quarterly market capitalization

Chart 5. NAVPREM development – discount companies

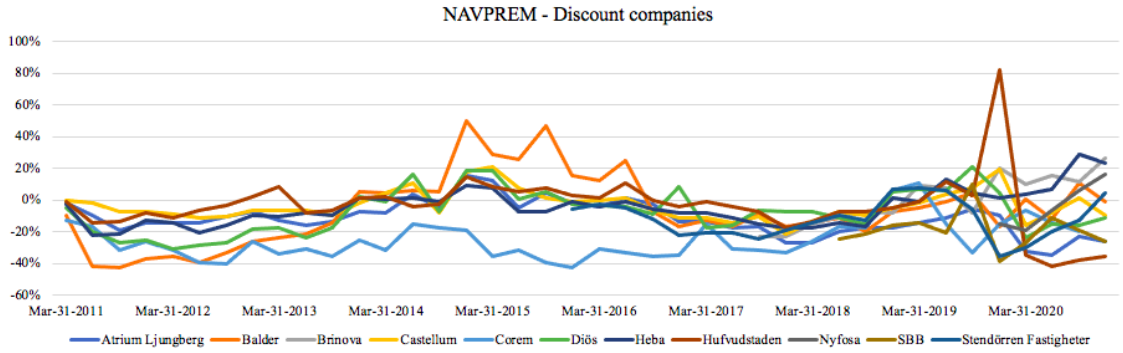
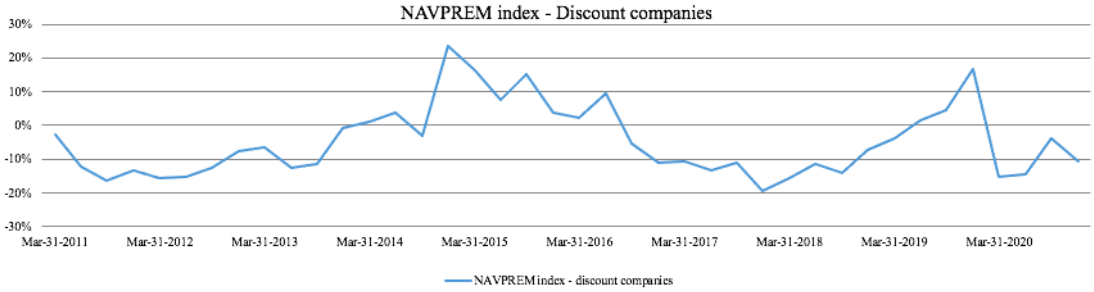


Chart 6. NAVPREM index – discount companies[4]



[4] Weighted average NAVPREM index by quarterly market capitalization