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Stock Price Reactions to Analyst Consensus Recommendation Upgrades

Evidence from Nasdaq Helsinki 2015-2025

Department of Accounting and Finance
Bachelor's thesis

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This study examines stock price reactions to observable consensus recommendation upgrades to Buy on Nasdaq Helsinki. The empirical analysis uses IBES analyst recommendation data and stock return data from LSEG Workspace over the period 2015–2025, with a final sample of 520 consensus upgrades. The analysis is conducted using a market model event study, with an estimation window of (−250, −30) and an event window of (−10, +10) trading days. The results show no statistically significant abnormal return on the event day and no evidence of post-event drift. Instead, abnormal returns are concentrated before the consensus upgrade becomes observable. Over the (−10, −1) window, cumulative abnormal returns are approximately 1.58%, indicating that price adjustment begins prior to the recorded event date. This pattern is consistent with the idea that information enters the market earlier through individual analyst revisions or related signals and is incorporated into prices gradually. The results remain robust when applying alternative earnings exclusion windows and a market-adjusted return model, indicating that they are not driven by model specification or earnings-related effects. From a practical perspective, the findings indicate that investors who react only to published consensus upgrades are unlikely to earn abnormal returns. Future research could examine individual analyst revisions to better identify the timing of information arrival and compare their effects with those observed at the consensus level.

Keywords: Analyst recommendations, consensus upgrades, event study, abnormal returns, Nasdaq Helsinki

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Tässä tutkimuksessa tarkastellaan, liittyykö analyytikkojen konsensussuositusten päivityksiin osta-tasolle osakekurssireaktioita Helsingin pörssissä (Nasdaq Helsinki). Aineisto yhdistää IBES-analyytikkosuositusdatan ja LSEG Workspace -markkinadatan vuosilta 2015–2025 ja lopullinen otos sisältää 520 konsensuspäivitystä. Menetelmänä käytetään tapahtumatutkimusta soveltamalla markkinamallia estimointi-ikkunalla (−250, −30) ja tapahtumaikkunalla (−10, +10). Tulokset eivät osoita tilastollisesti merkitseviä epänormaaleja tuottoja tapahtumapäivänä eikä sen jälkeen. Sen sijaan epänormaalit tuotot painottuvat konsensusmuutosta edeltävälle ajanjaksolle, ja kumulatiivinen epänormaali tuotto on noin 1,58 % ikkunassa (−10, −1). Tämä viittaa siihen, että osakekurssit alkavat sopeutua jo ennen kuin konsensuspäivitys tulee havaittavaksi aineistossa. Yksi mahdollinen selitys on, että informaatio välittyy markkinoille aiemmin esimerkiksi yksittäisten analyytikkosuositusten kautta. Tulokset säilyvät samankaltaisina vaihtoehtoisilla tulosjulkistussuodatuksilla ja markkinakorjatulla tuottomallilla, mikä viittaa siihen, etteivät havainnot riipu mallivalinnasta tai tulosjulkistuksista. Käytännön näkökulmasta tulokset viittaavat siihen, että pelkkiin konsensuspäivityksiin reagoivat sijoittajat eivät todennäköisesti saa epänormaaleja tuottoja. Jatkotutkimuksessa olisi luontevaa tarkastella yksittäisiä analyytikkosuosituksia ja verrata niiden vaikutuksia konsensustason muutoksiin.

Avainsanat: Analyytikkosuositukset, konsensussuositukset, tapahtumatutkimus, epänormaalit tuotot, Nasdaq Helsinki

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 Introduction

1.1 Background and motivation

Analyst recommendations are widely used in financial markets as simple investment signals, typically expressed as buy, hold, or sell ratings. Both institutional and individual investors follow them because they provide a straightforward way to interpret firm-level information. At the same time, it is not entirely clear how much new information these signals actually provide for stock prices, or when it is incorporated into prices if they provide something the markets have not already priced. This thesis focuses on changes in analyst recommendations at the consensus level. Compared to individual analyst revisions, consensus revisions usually adjust more gradually, meaning that observable changes may occur with a delay relative to the underlying signals that drive the price reactions.

The impact of these recommendations is typically discussed within the framework of market efficiency. According to the efficient-market hypothesis, stock prices should reflect all publicly available information without delay (Fama, 1970, 1991). If this holds, recommendation changes should not generate abnormal returns beyond a short period.

However, empirical evidence does not fully support this view, as early studies have documented abnormal returns following recommendation revisions. For instance, Womack (1996) reports abnormal returns after recommendation changes, while Barber et al. (2001) show that trading strategies based on these signals can generate excess returns. Other studies suggest that the strength of these effects depends on factors such as firm characteristics, analyst characteristics, and the surrounding information environment (Jegadeesh et al., 2004; Jegadeesh & Kim, 2006; Loh & Stulz, 2011).

Most of this evidence comes from large markets, particularly the United States (Womack, 1996; Barber et al., 2001), while evidence from smaller European markets appears to be more limited. This is relevant because differences in market structure, analyst coverage, and liquidity may influence how information is incorporated into prices. For this reason, the Finnish stock market provides an interesting setting for examining these issues. Nasdaq Helsinki is a relatively small but developed market, where analyst coverage is lower, and trading activity is more limited than in major exchanges. Because of this, price reactions may differ from those observed in larger markets. At the same time, analyst recommendations and their consensus may play a more important role in such an environment, as investors may rely more heavily on analyst information in smaller market environments.

Much of the prior literature focuses on individual analyst revisions rather than consensus-level measures. Consensus recommendations aggregate multiple analyst opinions and adjust more gradually over time, meaning that the observable consensus revision may not coincide with the timing of the underlying information arrival.

1.2 Research question

This study examines stock price reactions to observable consensus revisions on Nasdaq Helsinki. The focus is on consensus-level upgrades to Buy.

The main research question is: *Do observable consensus recommendation upgrades to Buy generate abnormal stock returns, and how are these returns distributed before, during, and after the observable event?*

The study considers multiple event windows around the upgrade to examine when the price adjustment occurs, which allows examination of whether abnormal returns occur before, during, or after the event.

Reactions may also differ across firms of different market capitalizations and characteristics. Prior research has documented that firm size may influence the magnitude of price responses. This is likely due to smaller firms having higher information asymmetry, lower analyst coverage, and lower liquidity. To account for this, the analysis will additionally compare these effects.

Only consensus recommendation revisions will be used rather than individual analyst updates. Consensus measures aggregate multiple analysts' opinions and are updated only after enough individual revisions shift the overall median of recommendations. This is why the observable consensus change may occur with a delay relative to the underlying analyst actions and the initial signals. This timing issue is important for interpreting the empirical results, as stock prices may begin to adjust before the consensus revision becomes visible in the data. This implies that the observable consensus revision may reflect information that has already been partially incorporated into stock prices.

1.3 Contribution

This thesis examines the timing of stock price reactions around observable consensus recommendation upgrades on Nasdaq Helsinki, with a particular focus on how consensus changes may lag underlying analyst activity.

First, it provides evidence from Nasdaq Helsinki, a less studied European equity market. Most prior research has focused on larger markets, so evidence from Nordic markets remains limited.

Second, the analysis focuses on consensus-level recommendation upgrades. This allows the study to examine the timing of observable consensus changes, which may lag underlying individual analyst updates and therefore may not coincide with the initial arrival of new information.

Third, the study applies a standard event study framework to examine short-term price reactions. By using multiple event windows, the analysis provides insight into the timing of price adjustment.

Finally, the study includes a cross-sectional analysis of firm size and analyst coverage to assess whether reactions differ across firms. The study also has practical relevance, as it provides insight into whether observable consensus recommendation upgrades can be used as trading signals, particularly in smaller markets.

1.4 Structure

The remainder of this thesis is structured as follows. Chapter 2 reviews the literature. Chapter 3 describes the data and methodology of the study. Chapter 4 presents the results and Chapter 5 discusses the findings. Chapter 6 concludes.

2 Literature review

2.1 Analyst recommendations

Analyst recommendations are widely used as simplified investment signals, typically expressed as buy, hold, or sell ratings accompanied by target prices. They summarise analysts' expectations about future firm performance in a concise and easily interpretable form, without providing a full valuation analysis. It is not clear whether such signals convey information not yet fully incorporated into stock prices. Empirical evidence suggests that they often do, as recommendation changes are frequently followed by stock price reactions.

These effects are commonly analysed within the framework of market efficiency. According to the efficient market hypothesis, stock prices are expected to reflect publicly available information without delay (Fama, 1970, 1991), implying that recommendation changes should not generate abnormal returns beyond a short horizon. However, empirical findings do not fully support this implication. For example, Womack (1996) documents large and mostly permanent abnormal returns following recommendation revisions, with particularly strong effects for negative recommendations. Stickel (1995) shows that these reactions vary across firms and tend to be stronger for smaller firms, which may reflect differences in information asymmetry and analyst coverage.

Subsequent studies generally confirm that analyst recommendations contain predictive information for future returns, although the strength of this effect depends on how recommendations are measured. Jegadeesh et al. (2004) show that recommendation revisions provide incremental information beyond other return predictors. At the same time, evidence on trading strategies highlights an important limitation. While strategies based on analyst recommendations can generate positive abnormal returns before transaction costs (Barber et al., 2001), these effects are largely offset once transaction costs are considered. These findings indicate that any inefficiencies are limited and difficult to exploit in practice, particularly for regular investors.

Evidence from international markets shows that recommendation revisions are associated with stock price reactions, although the exact magnitude of these effects is not consistent across countries. Jegadeesh & Kim (2006) find that recommendation revisions generate significant reactions across all G7 countries except Italy, with the strongest responses in the United States. This cross-country variation may reflect differences in institutional factors, such as analyst coverage and market liquidity. They also find that US analysts appear to be more skilled at identifying mispriced stocks, which may partly explain the stronger reactions in that market.

Loh (2010) finds that limited investor attention can weaken the immediate response to recommendation changes, particularly for low-attention stocks, which exhibit smaller reactions around the announcement but stronger subsequent return drift. This suggests that price adjustment may occur gradually as information diffuses across investors. Institutional investors can further amplify these dynamics. Brown et al. (2014) find that mutual funds adjust their holdings in response to recommendation changes, with coordinated trading around upgrades and downgrades. Such responses can contribute to short-term price pressure and, in some cases, subsequent reversals. Together, these findings suggest that recommendation changes influence both trading behavior and the timing of price adjustment. Most prior evidence on these effects comes from large and highly liquid markets, particularly the United States, while evidence from smaller European and Nordic markets remains limited. This makes Nasdaq Helsinki a relevant and interesting setting for further analysis.

In addition to information-based explanations, analyst recommendations may also reflect behavioral and institutional biases. Analysts face incentives related to career concerns and reputation, which can influence their behavior and reduce the objectivity of their recommendations. These incentives may also be linked to investment banking relationships, which can create conflicts of interest in sell-side research (Ljungqvist et al., 2006). According to Hong and Kubik (2003), career outcomes of analysts depend not only on forecast accuracy but also on the degree of optimism in forecasts. Even among analysts with similar accuracy, those who are more optimistic relative to the consensus tend to have more favorable career outcomes. This can encourage overly positive recommendations and may affect their informational content and reliability, suggesting that analyst recommendations may not always provide a fully unbiased reflection of firm fundamentals and should be interpreted with caution.

Similar analyst optimism has also been documented across international markets. Balboa et al. (2008) examine the value of analyst recommendations in several developed countries and find consistent evidence of optimism bias, with analysts issuing significantly more buy than sell recommendations. This bias affects the informational value of recommendations: sell recommendations tend to provide stronger and more reliable signals, while the value of buy recommendations is more limited and depends on the level of optimism across countries. At the same time, recommendation changes, such as upgrades and downgrades, are consistently associated with stock price reactions. This suggests that, despite the presence of optimism bias, recommendation changes still contain relevant information.

Despite their informational value, analyst recommendations provide only a partial view of firm fundamentals. Financial statement analysis can offer additional predictive power beyond analyst consensus recommendations, suggesting that both prices and recommendations do not fully reflect all available information (Wahlen & Wieland, 2011). This is particularly relevant when focusing on recommendation changes, which may capture only part of the underlying information. As a result, observable consensus changes may reflect the gradual incorporation of information rather than its initial arrival in the market.

2.2 Recommendation revisions

Recommendation revisions are generally considered more informative than levels, which is why this study focuses on consensus-level upgrades to Buy. The literature commonly distinguishes between recommendation levels and recommendation changes: levels can reflect information that is already in prices, while revisions reflect changes in analyst views (Barber et al., 2006; Jegadeesh et al., 2004; Womack, 1996). Many studies examine upgrades and downgrades as separate events that can affect prices. Jegadeesh et al. (2004) show that changes in analyst recommendations contain predictive information about future returns, suggesting that revisions may capture aspects of firm quality that are not fully visible in other indicators.

Upgrades are generally viewed as positive signals, as they reflect improved expectations about firm fundamentals, earnings, or valuation. Buy and strong Buy recommendations indicate that the analyst considers the stock to be undervalued relative to its current price. In this sense, upgrades can be interpreted as revisions in expected firm value rather than simple changes in opinion. Prior evidence shows that such upgrades are associated with positive abnormal returns (Jegadeesh et al., 2004; Stickel, 1995; Womack, 1996), suggesting that markets respond to these signals.

Most of the literature focuses on individual analyst revisions, which capture changes in recommendations at the time they are issued, while consensus-level measures aggregate multiple analyst opinions and therefore adjust more gradually. As a result, observable consensus changes may not coincide with the timing of the underlying analyst revisions or the initial arrival of information to the market. Consistent with this, Wahlen and Wieland (2011) show that such measures provide only a partial summary of firm fundamentals, as they do not incorporate all relevant information from financial statements.

One interesting finding in the literature is that market reactions are not always symmetrical, as reactions to negative downgrades (e.g., Buy to Sell) often generate stronger responses than positive upgrades (Womack, 1996). One explanation is analyst optimism, as discussed earlier (Hong & Kubik, 2003; Barber et al., 2006). Another is that investors are known to overreact to extreme information, particularly in the case of negative news (De Bondt & Thaler, 1985), while institutional constraints and trading frictions can further shape these reactions. The finding that reactions to negative revisions are stronger is not surprising, as investors usually have stronger responses to negative events, whereas positive signals may lead to more investigative behavior before making investment decisions.

Market reactions can also be affected by broader market conditions. Boni and Womack (2006) show that analyst-related signals are linked to industry trends and momentum, implying that price movements around recommendation changes are not always driven by a single event. Instead, they may reflect ongoing developments in the market. These effects can also vary across firms, analysts, and information environments (Jegadeesh & Kim, 2006; Loh & Stulz, 2011). While upgrades may contain new information, price movements around these events can also be influenced by changes in investor attention, expectations, and sentiment.

Not all recommendation changes lead to noticeable price reactions. Only a relatively small share of revisions produces statistically significant effects at the firm level (Loh & Stulz, 2011), pointing to substantial heterogeneity in the informational content of recommendation changes, with only some revisions conveying signals strong enough to move prices. This variation is important to consider when interpreting the results of this study.

2.3 Market efficiency

Analyst recommendation revisions allow us to examine how quickly markets respond to new information. If these revisions contain value-relevant information, price adjustments should occur around the announcement date, with abnormal returns concentrated within a relatively short window. This prediction follows directly from the semi-strong form of market efficiency, which implies that publicly available information should be incorporated into prices without delay. In practice, however, empirical evidence does not fully support this view, as several studies document more gradual price adjustment and delayed reactions to public information. One explanation is the gradual diffusion of information across investors (Hong et al., 2000), whereby information is incorporated into prices over time rather than immediately.

Different cumulative abnormal return (CAR) patterns can be observed around recommendation upgrades. Returns before the event may reflect anticipatory trading or early information arrival, while reactions around the announcement are more consistent with an immediate price adjustment. Post-event returns, in turn, may indicate delayed reactions or underreaction.

The presence of abnormal returns alone does not determine market efficiency. Instead, their timing and persistence provide more relevant information about how markets process new signals. Even in relatively efficient markets, short-term deviations may occur due to information asymmetries, trading frictions, or behavioral factors (Barberis et al., 1998; Fama, 1991). These effects may be more pronounced in smaller markets, where analyst coverage is lower and liquidity is more limited.

2.4 Firm characteristics

Stock price reactions to recommendation changes can vary across firms, particularly by firm size. Firm size plays an important role in explaining cross-sectional variation in returns and is typically measured by market capitalization (Fama & French, 1992). In practice, smaller firms tend to receive less analyst coverage and attract less investor attention, which can slow the incorporation of new information into prices (Hong et al., 2000). As a result, price reactions may be less concentrated around a single point in time. Loh & Stulz (2011) show that market reactions vary across firms and events, suggesting that the impact of analyst recommendations depends on the surrounding information environment.

When information is limited, analyst recommendations may play a more prominent role, as they represent a relatively larger addition to the available information. This is consistent with the idea that firm-specific information spreads more gradually among firms with lower investor recognition, leading to slower price adjustment and abnormal returns that are not confined to a narrow event window (Hong et al., 2000).

Firm characteristics are also closely linked to liquidity and trading frictions. Smaller firms are typically less liquid, which can constrain arbitrage activity and slow the correction of mispricing. This may allow deviations from fundamental value to persist for longer periods, particularly when trading activity is limited.

Most existing evidence focuses on individual analyst recommendation changes in major markets, particularly the United States, while evidence from smaller European and Nordic markets remains limited. This is especially relevant for Nasdaq Helsinki, where lower analyst coverage and trading activity may influence both the timing and magnitude of stock price reactions.

2.5 Hypothesis

This study examines stock price reactions to observable consensus-level recommendation upgrades to Buy on Nasdaq Helsinki. The hypotheses draw on prior research on analyst recommendations and market efficiency, while accounting for the differences between individual analyst revisions and consensus-level measures.

Most prior research focuses on individual analyst revisions and finds that such changes are associated with abnormal stock returns (Womack, 1996; Barber et al., 2001; Jegadeesh & Kim, 2006). In contrast, consensus recommendations aggregate multiple analyst opinions and adjust more gradually, meaning that observable consensus revisions may not coincide with the initial arrival of information to the market.

The first hypothesis examines whether observable consensus upgrades are associated with abnormal performance within the event window:

H1: Observable consensus recommendation upgrades to Buy are associated with positive abnormal returns around the event window.

Because consensus measures reflect analyst revisions that occur at different points in time, price adjustment may begin before the consensus change becomes observable. If investors react to earlier recommendation updates or related information, abnormal returns can already appear before the recorded event date.

H2: Abnormal returns may be concentrated before the observable consensus recommendation change.

Market reactions may also vary across firms depending on their information environment. Smaller firms typically have lower analyst coverage, reduced liquidity, and higher information asymmetry, which may increase the importance of analyst signals.

H3: The stock price reaction to consensus upgrades is expected to be stronger for smaller firms.

3 Data and methodology

3.1 Data

3.1.1 Data sources

The analysis uses analyst recommendation data from the Institutional Brokers' Estimate System (IBES) and market data from LSEG Workspace. The IBES data includes the consensus recommendation median variable RECMED and the analyst coverage variable RECNO. Recommendations on RECMED are recorded on a numerical scale from 1 (Strong Buy) to 5 (Strong Sell).

Daily stock price data for companies listed on Nasdaq Helsinki, the OMX Helsinki Price Index (OMXHPI), firm-level daily market capitalization (MCAP), and quarterly earnings announcement dates are sourced from LSEG Workspace. Daily stock and market returns are calculated as log returns from the price series.

The final firm-day panel is constructed using R by merging stock return data, market return data, IBES recommendation data, and firm-level market capitalization by firm and date. Firm identifiers are standardized across datasets for consistent matching across sources.

Firm size is measured using market capitalization (MCAP). The dataset is structured as a firm-day panel, where trading days are indexed relative to each event to construct event time.

Information on corporate earnings is incorporated by collecting quarterly earnings report dates. These dates are used to identify and exclude events that may be affected by earnings-related information. Only earnings announcements are used to control for confounding events, although they do not capture all potential sources of confounding information. This is acknowledged as a limitation of the study.

3.1.2 Sample selection

The sample includes firms listed on Nasdaq Helsinki over the period 2015–2025. Analyst recommendation events are identified using the IBES consensus recommendation variable RECMED. The initial dataset contains 544 consensus upgrades to Buy across 118 firms.

To reduce potential contamination from other firm-specific information events, recommendation revisions occurring within ±1 trading day of earnings announcements are excluded from the baseline sample, reducing the number of events to 524.

Reliable estimation of expected returns requires a sufficient history of return observations. Events are therefore retained only if at least 120 valid daily return observations are available within the estimation window (−250, −30), resulting in a final sample of 520 events from 118 firms. These filters ensure that each event represents a distinct consensus upgrade and that sufficient data is available for reliable estimation of expected returns.

Table 1. Sample construction

Sample step	Events
Initial consensus upgrades	544
After earnings exclusion	524
Final sample	520
Number of firms	118

3.1.3 Event definition

The event is defined as a consensus recommendation upgrade to Buy. Events are identified using the RECMED variable, which represents the median analyst recommendation.

An event corresponds to a transition in RECMED from a value above 2 to a value of 2 or below. To avoid repeated counting of consecutive upgrade states, only the first qualifying day is retained.

The RECMED variable is observed at a daily frequency and reflects the median analyst recommendation for each firm on a given calendar day. This means that the recorded event date reflects the first day the updated consensus appears in the data, rather than the exact timing of underlying analyst revisions.

To reduce the impact of other firm-specific information events, upgrades close to earnings announcements are excluded. For each event, the distance to the nearest earnings announcement is calculated, and observations within ±1 trading day are removed. As a robustness check, wider exclusion windows of ±5 and ±10 trading days are also considered.

3.1.4 Descriptive statistics

The sample includes 544 recommendation upgrade events across 118 firms listed on Nasdaq Helsinki between 2015 and 2025. Events are relatively evenly distributed across years, ranging from 30 to 68 observations annually. The yearly distribution of events is reported in Table 2.

Table 2. Initial event sample (544 events)

Year	Number of events
2015	32
2016	30
2017	46
2018	48
2019	45
2020	68
2021	52
2022	58
2023	67
2024	42
2025	56

On average, each firm experiences approximately 4.6 recommendation upgrades, with a median of 4 events and a maximum of 13. This suggests that the sample is not dominated by a small number of firms, although some firms appear multiple times.

Some firms experience multiple upgrades, meaning that observations may not be fully independent at the firm level, which may affect statistical inference. This reflects the structure of a relatively small market, where analyst coverage tends to be concentrated on larger and more actively followed firms.

Firm characteristics vary across the sample. Market capitalization varies widely across firms, allowing the analysis of size-related differences in stock price reactions. Analyst coverage also differs, as some firms are followed by many analysts while others receive only limited attention. Table 3 reports descriptive statistics for the event sample.

Table 3. Descriptive statistics of the event sample

Variable	Mean	Median	Std. dev.	Min	Max
Market capitalization (EUR millions)	2468	275	6247	7	46088
Analyst coverage (RECNO)	4.92	3.00	5.53	1	30

3.2 Methodology

3.2.1 Event study framework

A standard event study methodology is used to examine stock price reactions to analyst consensus recommendation upgrades. This approach is commonly used in empirical finance to study how discrete information events affect security prices (Brown & Warner, 1985; MacKinlay, 1997).

The approach separates normal returns from abnormal returns, which capture deviations from expected performance. If recommendation upgrades contain value-relevant information, stock prices are expected to adjust around the event date. The timing of these adjustments indicates when the market reacts, while their magnitude reflects the strength of the reaction.

Event time is defined relative to the recommendation upgrade, where $t = 0$ is the event day. The event window is $(-10, +10)$ trading days, which allows both pre- and post-event price movements to be examined.

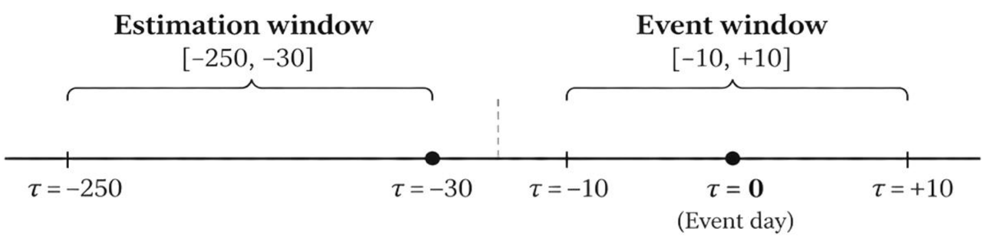

Figure 1. Event study timeline illustrating the estimation and event window.

3.2.2 Expected return model

Expected returns are estimated using the market model (MacKinlay, 1997), which assumes a linear relationship between a firm's return and the market return:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$

Where $R_{i,t}$ is the daily return of the firm i at time t, $R_{m,t}$ is the market return, α_i and β_i are firm-specific parameters, and $\varepsilon_{i,t}$ is the idiosyncratic error term. The market model controls for general market movements and isolates firm-specific price reactions. Compared to simpler benchmarks, such as market-adjusted returns, it typically results in lower residual variance and more precise estimates (MacKinlay, 1997).

Model parameters are estimated using ordinary least squares over the estimation window t ∈ [−250, −30], which is assumed to reflect normal return behavior. Events are retained only if at least 120 valid daily observations are available within this window.

3.2.3 Abnormal Returns

Abnormal returns are defined as the difference between realized and expected returns:

$$AR_{i,t} = R_{i,t} - \left(\widehat{\alpha}_i + \widehat{\beta}_i R_{m,t}\right)$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the estimated parameters from the estimation regression.

Abnormal returns measure firm-specific performance after controlling for systematic market movements. To examine average market reactions, abnormal returns are aggregated across events. The average abnormal return (AAR) is defined as:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} A\,R_{i,t}$$

where N is the number of events at time t. The average abnormal return helps identify the timing of price reactions.

Cumulative average abnormal returns (CAAR) are obtained by summing AAR over time:

$$CAAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_t$$

CAAR measures total average abnormal performance across events within a given window and summarizes the overall market reaction.

While average abnormal returns describe aggregate market reactions across events, cumulative abnormal returns (CAR) measure abnormal performance at the individual event level. At the event level, cumulative abnormal returns are defined as:

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{i,t}$$

where $CAR_i(t_1, t_2)$ is the cumulative abnormal return for the event i over the event window of t_1 to t_2. CAR measures the total abnormal return for a given event over the specified window.

The analysis examines several event windows around the upgrade date to capture the timing of potential market reactions before, during, or after the event day. The following windows are considered:

- **(−10, −1)**
- **(−5, 0)**
- **(0, 0)**
- **(−1, +1)**
- **(0, +5)**
- **(0, +10)**
- **(+1, +10)**
- **(−5, +5)**
- **(−10, +10)**

These windows help to identify potential pre-event anticipation effects, immediate announcement reactions, and post-event adjustments.

Conventional abnormal return tests may be sensitive to event-induced changes in return volatility. To account for potential changes in return volatility, standardized abnormal returns are computed:

$$SAR_{i,t} = \frac{AR_{i,t}}{\hat{\sigma}_{\varepsilon,i}}$$

where $\hat{\sigma}_{\varepsilon,i}$ denotes the standard deviation of residuals from the estimation regression.

Standardizing abnormal returns scales performance by firm-specific return volatility, improving comparability across events and robustness to potential heteroskedasticity around the event date.

Standardized cumulative abnormal returns (SCAR) are obtained by summing standardized abnormal returns over the event window. These measures improve comparability across firms and are used in cross-sectional tests.

3.2.4 Statistical tests

Statistical inference is conducted at both the daily and cumulative levels to evaluate whether abnormal returns differ significantly from zero. Event study tests may be affected by cross-sectional correlation in abnormal returns when multiple events occur within similar time periods, as discussed in the literature (Kolari & Pynnönen, 2010). However, no explicit correction for cross-sectional correlation is applied.

Parametric t-tests are applied to average abnormal returns (AAR) to assess whether the mean abnormal performance on each event day differs from zero. Additionally, cross-sectional t-tests are applied to cumulative abnormal returns (CAR) to evaluate whether average abnormal performance over different event windows is statistically significant.

To account for potential event-induced variance and heteroskedasticity, a standardized cross-sectional test based on standardized cumulative abnormal returns (SCAR) is also implemented, following the logic of Boehmer et al. (1991). This improves robustness when return variance changes around the event date. For cumulative windows, test statistics are computed using event-level cumulative abnormal returns.

All tests are two-sided, and statistical significance is evaluated at conventional levels. The analysis is implemented using R.

4 Results

4.1 Abnormal returns

Abnormal returns (AR) are estimated using the market model over the pre-event estimation window (-250, -30). No statistically significant abnormal returns are observed on the announcement day, and post-event returns remain close to zero. The mean abnormal return at t = 0 is close to zero and statistically insignificant (p = 0.924).

Average abnormal returns (AAR) are used to examine how price reactions evolve over time. Figure 2 presents the average abnormal return around the event date. Daily abnormal returns fluctuate around zero, and individual AAR values remain statistically insignificant throughout the event window. The pattern becomes clearer when abnormal returns are accumulated over time into cumulative measures, as shown in the following section.

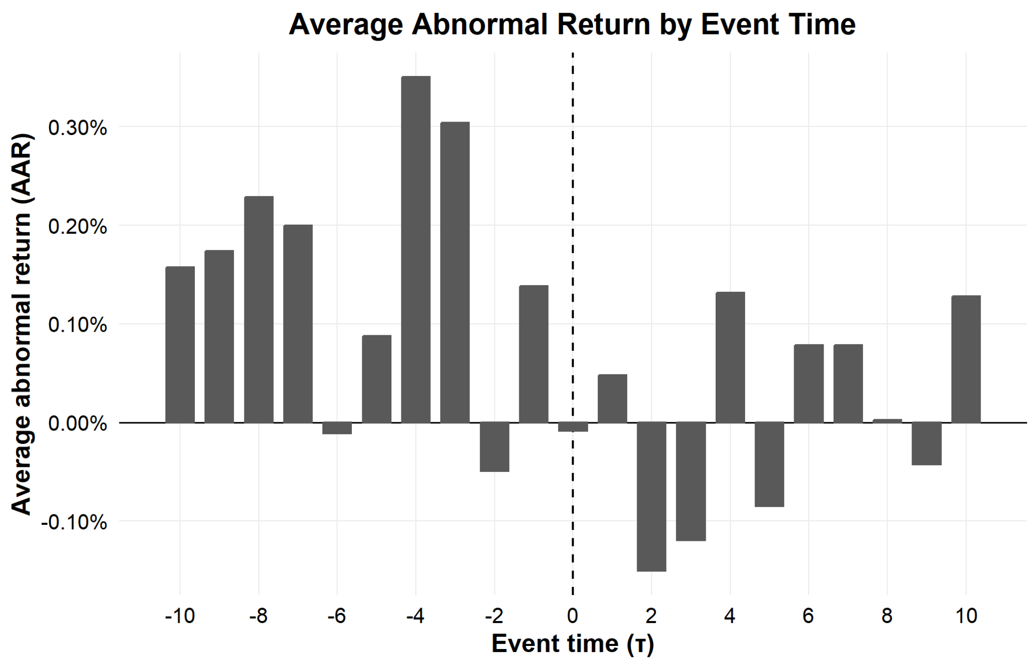

Figure 2. Average abnormal returns around consensus recommendation upgrades (N=520).

4.2 Cumulative abnormal returns

Abnormal returns are then accumulated into cumulative abnormal returns (CARs) across different event windows. Cumulative average abnormal returns (CAAR) are obtained by aggregating AAR over time. Figure 3 illustrates the CAAR around recommendation upgrades.

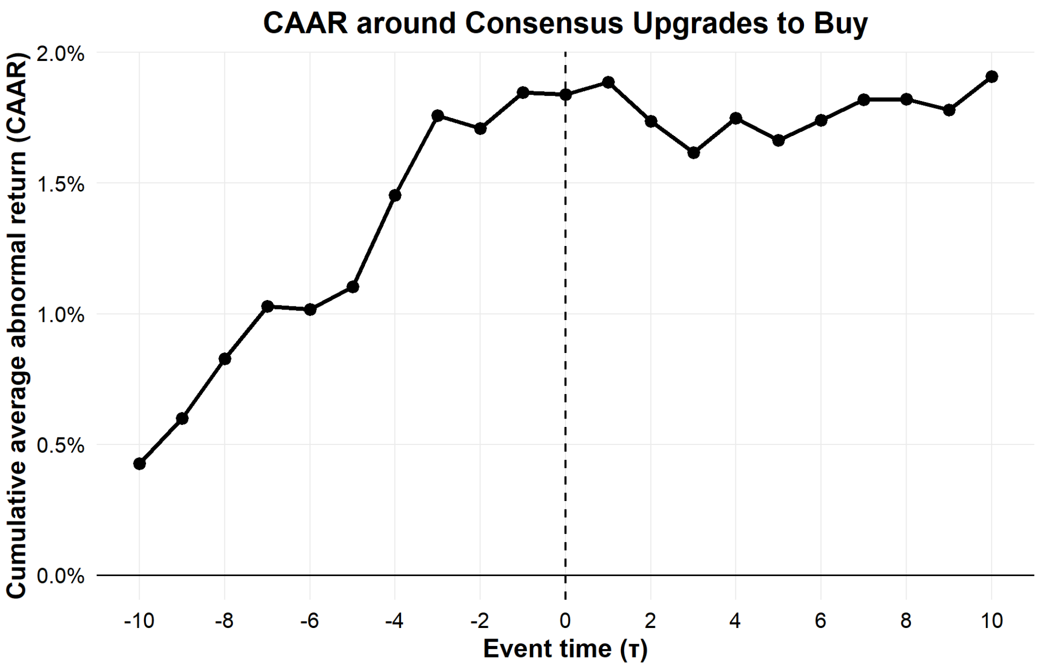

Figure 3. Cumulative average abnormal returns around consensus recommendation upgrades (N=520).

Cumulative abnormal returns rise in the days leading up to the event. The CAAR is already positive at t = -10 (approximately 0.5%) and increases further to around 1.8% by the event date. After the announcement, the curve flattens, indicating limited additional abnormal performance.

Mean CAR (-10, -1) is 1.58% and is statistically significant ($t = 4.49$, $p < 0.001$), indicating an abnormal price increase before the consensus upgrade becomes observable. Similarly, CAR (-5, 0) is 0.82% and is statistically significant ($t = 3.06$, $p = 0.002$).

Post-event abnormal returns remain small, with CAR (1, 10) and CAR (0, 10) both small and statistically insignificant, showing no evidence of post-announcement drift. The contrast between significant pre-event CAR (-10, -1) and insignificant post-event CAR (1, 10) indicates that abnormal performance occurs primarily before the consensus revision becomes observable. This is consistent with gradual information diffusion, where information is incorporated into prices before the visible consensus change.

Across the full event window, CAR (-10, +10) equals 1.64% and is significant ($t = 3.68$, $p < 0.001$). Results for all event windows are reported in Table 4.

Table 4. Cumulative abnormal returns across event windows

Event window	Mean CAR (%)	t-statistic	p-value
(-10, -1)	**1.578%**	**4.488**	**<0.001**
(-5, 0)	**0.822%**	**3.060**	**0.002**
(0, 0)	-0.009%	-0.095	0.924
(+1, +10)	0.067%	0.247	0.805
(0, +10)	0.059%	0.203	0.839
(-1, +1)	0.177%	1.269	0.205
(0, +5)	-0.184%	-0.887	0.375
(-5, +5)	**0.646%**	**1.993**	**0.047**
(-10, +10)	**1.637%**	**3.681**	**<0.001**

This table reports cumulative abnormal returns (CAR) for different event windows. Abnormal returns are estimated using the market model with the OMX Helsinki Price Index as the market benchmark and an estimation window of (−250, −30) trading days. p-values are based on two-sided cross-sectional t-tests.

4.3 Statistical tests and robustness

Statistical inference is based on cross-sectional t-tests of cumulative abnormal returns. A standardized cross-sectional test based on standardized abnormal returns (SCAR) is also implemented.

The standardized test supports the main results. For the full event window, SCAR (-10, +10) yields a test statistic of 3.97 ($p < 0.001$), indicating statistically significant cumulative abnormal performance. SCAR (-5, +5) is also statistically significant at the 5% significance level.

By contrast, shorter event windows such as SCAR (-1, +1) and SCAR (0, +5) remain statistically insignificant, similarly to previous results. This is consistent with the absence of a clear announcement-day reaction documented in the previous section.

Table 5. Standardized cross-sectional test results

Window	Mean SCAR	t-statistic	p-value
SCAR (-1, +1)	0.102	1.371	0.171
SCAR (0, +5)	-0.075	-0.674	0.501
SCAR (-5, +5)	0.310	1.980	0.048
SCAR (-10, +10)	0.863	3.969	<0.001

This table reports standardized cumulative abnormal returns (SCAR) for different event windows. SCAR values are based on standardized abnormal returns aggregated over each event window. Abnormal returns are estimated using the market model with the OMX Helsinki Price Index as the benchmark. p-values are based on two-sided standardized cross-sectional tests.

Robustness to earnings announcement contamination is examined by widening the exclusion window. When applying a ±5 trading-day exclusion window, the sample size decreases to 481 events, yet the pre-event abnormal return remains positive at 1.45% and statistically significant ($p < 0.001$). Under an even stricter ±10-day exclusion window (417 events), the effect remains positive at 1.26% ($p < 0.001$).

The same pattern is observed for the full event window. Mean CAR (-10, +10) remains positive and statistically significant under both alternative exclusion windows, although the magnitude declines to some extent. This suggests that the results are not driven by earnings announcements close to the recommendation date and that the pre-event abnormal returns are more likely related to analyst activity rather than earnings-related effects.

Table 6. Robustness: alternative earnings exclusion windows

Exclusion window	**Remaining Events**	**Mean CAR (-10, -1)**	**p-value**	**Mean CAR (-10, +10)**	**p-value**
Baseline (±1 earnings)	520	1.578 %	<0.001	1.637%	<0.001
±5-day earnings exclusion	481	1.450 %	<0.001	1.481%	0.001
±10-day earnings exclusion	417	1.256 %	<0.001	1.193%	0.011

This table reports cumulative abnormal returns (CAR) under different earnings announcement exclusion windows. Observations with earnings announcements within ±1, ±5, and ±10 trading days of the event date are excluded. Abnormal returns are estimated using the market model with the OMX Helsinki Price Index as the benchmark. p-values are based on two-sided cross-sectional t-tests.

As an additional robustness check, abnormal returns are also estimated using a market-adjusted model, where expected returns are proxied directly by the market return. Unlike the market model, this approach does not rely on estimated parameters and provides a simple but useful benchmark for assessing the sensitivity of the results to model specification.

The results are consistent with the baseline findings. Abnormal performance is still concentrated in the pre-event period, while neither the announcement day nor the post-event window shows statistically significant abnormal returns. For example, the market-adjusted CAR (−10, −1) is 1.73% ($t = 5.11$, $p < 0.001$), whereas CAR (0, 0) ($t = -0.37$, $p = 0.713$) and CAR (1, 10) ($t = 0.65$, $p = 0.519$) remain statistically insignificant. Over the full window, CAR (−10, +10) is 1.86% ($t = 4.41$, $p < 0.001$). Although abnormal returns are slightly higher, the main findings remain unchanged and are not sensitive to the choice of expected return model, at least when compared to simple market-adjusted returns.

4.4 Cross-sectional analysis

Cross-sectional variation is examined by firm size and analyst coverage. First, firms are grouped by size based on market capitalization at the event date. Figure 4 presents cumulative abnormal returns for small-cap and large-cap firms using a median split of market capitalization. Small firms exhibit somewhat larger cumulative abnormal returns than large firms, but the differences are not statistically significant.

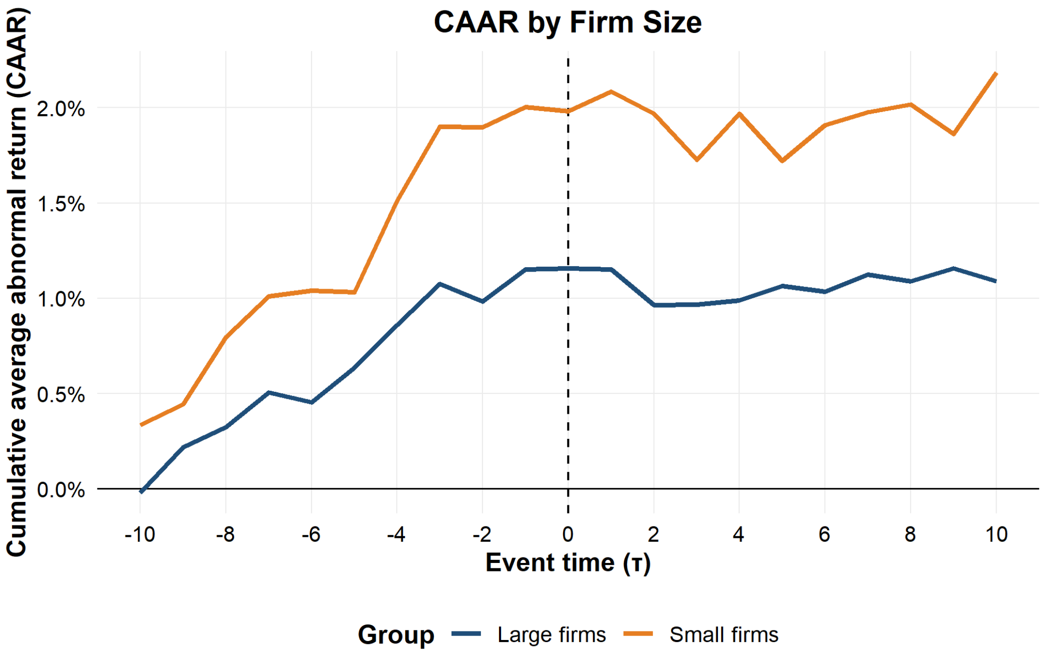

Figure 4. Cumulative abnormal returns by firm size (median split).

Second, analyst coverage is examined using the number of analyst recommendations available in the IBES database (RECNO). Firms are divided into low- and high-coverage groups. Figure 5 compares cumulative abnormal returns across these groups. The results are similar across groups, and the difference between low- and high-coverage firms is not statistically significant.

In the pre-event window (-10, -1), average cumulative abnormal returns are higher for smaller firms (2.00%) than for larger firms (1.15%), but the differences are not statistically significant ($t = -1.21$, $p = 0.227$). The full event window of (-10, +10) shows similar results with higher returns for smaller firms (2.18%) than for larger firms (1.09%), respectively, again with no significant difference ($p = 0.218$).

Similarly, no statistically significant differences are observed between low- and high-coverage firms. In the pre-event window (−10, −1), average cumulative abnormal returns are 1.69% and 1.39%, respectively ($t = -0.45$, $p = 0.656$). In the full window (−10, +10), the corresponding values are 1.74% and 1.46% ($p = 0.740$).

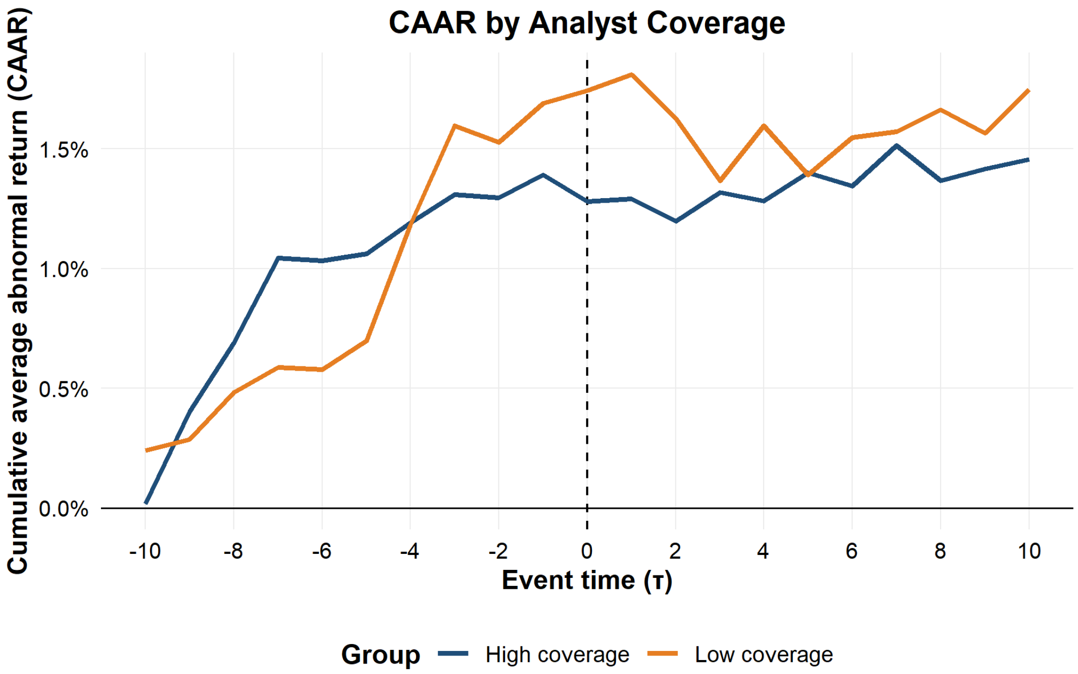

Figure 5. Cumulative abnormal returns by analyst coverage (median split of RECNO).

Overall, there is no strong evidence of differences in market reactions across firm size or analyst coverage. This may be related to the use of consensus-level data, which can mask earlier information arrival. Using individual analyst revision data could capture these effects more clearly.

5 Discussion

5.1 Interpretation of results

The study examines stock price reactions to consensus-level upgrades to Buy on Nasdaq Helsinki. The final sample includes 520 events after applying the filters described in the methodology. Abnormal returns were estimated using the market model over the estimation window (-250, -30), and cumulative effects are examined across several event windows. The results are clear: there are no statistically significant abnormal returns on the event day, and there is no evidence of post-event drift. Instead, abnormal returns appear before the consensus upgrade becomes visible in the data, indicating that prices begin to adjust before the consensus upgrade is observable.

This pattern is related to the definition of the event. The results are based on observable consensus changes rather than individual analyst revisions, meaning that the recorded event date does not necessarily match the timing of the underlying information. The consensus measure can react with a delay because it combines the recommendations of many analysts and is updated only after enough revisions have been made. By the time the consensus changes, the information may already be reflected in stock prices.

This explains why price movements are seen before the event date, likely already reflecting earlier signals such as individual analyst revisions or other information reaching the market. Therefore, the consensus upgrade does not appear to be the starting point of the price reaction, but rather a later step in the process. This is consistent with earlier literature on gradual information diffusion (Hong et al., 2000), in which news does not reach all investors at the same time, and price adjustments can occur over several days. Because the timing is partly affected by the event definition, the observed patterns do not necessarily imply market inefficiency.

The lack of post-event abnormal returns suggests that once the consensus upgrade is observable, prices adjust without delay, and the results are consistent with semi-strong market efficiency. Similar results are obtained when using a market-adjusted return model as an additional robustness check, which further supports the findings.

Based on these results, the hypotheses can be assessed. H1 is partially supported, as abnormal returns are observed within the event window, but not on the event day itself. H2 is supported, as abnormal performance occurs before the observable consensus upgrade, which aligns with the idea that consensus revisions may lag earlier analyst actions. In particular, the significant pre-event CAR (-10,

-1) of approximately 1.58% and CAR (-5, 0) of approximately 0.82% support this interpretation. H3 is not supported, as the cross-sectional analysis does not reveal statistically significant evidence of differences across firm size or analyst coverage. This may be related to the use of consensus measures rather than individual analyst revisions.

5.2 Economic significance and implications

Although the results are statistically significant, their economic relevance depends on whether they can be exploited in practice. The cumulative abnormal return of approximately 1.6% over the (-10, +10) window is economically meaningful. However, because abnormal performance is concentrated in the pre-event period, investors reacting only to the observable consensus upgrade are unlikely to earn statistically significant abnormal returns in subsequent days.

In a relatively small market such as Nasdaq Helsinki, trading also involves transaction costs, bid–ask spreads, and liquidity constraints. These factors can further reduce potential profits, and for this reason, the documented abnormal returns are unlikely to translate into consistently profitable trading strategies based solely on observed consensus recommendation upgrades.

Overall, the results suggest that observable consensus-level recommendation changes reflect information that is already being incorporated into prices, rather than triggering new price reactions when they become visible. This highlights the importance of event definition when interpreting the informational value of analyst recommendations.

5.3 Limitations

Several limitations should be acknowledged. One issue is that the event study framework cannot fully separate the effect of analyst recommendation changes from other information arriving on the market at the same time. Although the market model controls for general market movements, firm-specific news, macroeconomic developments, or sector-level events may still affect stock prices during the event window. This is why part of the observed abnormal returns may be driven by factors unrelated to recommendation changes.

Another limitation relates to the use of consensus-level recommendations instead of individual analyst revisions. Since consensus measures combine multiple analyst opinions, the observed event date may lag the actual timing of analyst activity. Consequently, some of the abnormal returns may appear in the pre-event period due to earlier information arrival. The timing of IBES consensus data is also relevant here. The recorded event dates may not fully capture when recommendation changes become publicly available, which may partly explain the observed pre-event abnormal returns.

Since the analysis focuses on a relatively small market, the results may not fully generalize to larger exchanges, where differences in liquidity, analyst coverage, and investor structure may affect how quickly information is incorporated into prices.

Expected returns are estimated using the market model. Although this approach is commonly used in event study research (MacKinlay, 1997), alternative specifications or different estimation windows could lead to somewhat different estimates of abnormal returns. As a robustness check, a market-adjusted model was also applied, and it produced similar results. Nonetheless, the main finding of this study relates to the timing of returns rather than their exact magnitude, so the pre-event pattern is unlikely to be driven solely by model choice.

An additional limitation is the presence of repeated events per firm. Since multiple recommendation upgrades are observed for the same firms, observations may not be fully independent. This can affect statistical inference, as cross-sectional tests may be biased when observations are correlated within firms. No explicit correction for this is implemented, which should be considered when interpreting the results.

5.4 Future research

Future research could examine individual analyst revisions in more detail to better identify the timing of information arrival and to compare these effects with consensus-level changes. Since consensus measures aggregate multiple analyst opinions, they may not fully capture the initial release of new signals, which makes analyst-level data a natural extension of this study.

It would also be useful to explore whether the observed pre-event return patterns vary across different types of firms. Differences in firm size, analyst coverage, or liquidity may affect how quickly information is incorporated into stock prices. Effects may also differ across industries or time periods, as market conditions and investor behavior evolve over time.

Another extension would be to examine the differences between analysts themselves. Prior literature suggests that analyst credibility and reputation may influence how strongly markets react to their recommendations. However, this type of analysis may be more challenging in smaller markets such as Finland, where analyst coverage is more limited. The analysis could also be extended to other markets to assess whether the observed patterns are specific to Nasdaq Helsinki or more general.

6 Conclusion

The objective of this study was to examine whether analyst consensus upgrades to Buy are associated with stock price reactions on the Nasdaq Helsinki market. The analysis applies an event study methodology to estimate abnormal returns around consensus revisions and their cumulative effects across different event windows. This thesis contributes to the literature on analyst recommendations and market efficiency by providing results from a small Northern European market.

The results show a clear pattern. There are no statistically significant abnormal returns on the announcement day of a consensus upgrade, nor is there evidence of post-event drift. Abnormal returns are concentrated in the pre-event period, where cumulative abnormal returns are both economically and statistically significant, while post-event returns are close to zero and statistically insignificant.

These reactions are likely related to the decision to use consensus-level data (RECMED) rather than individual analyst revisions. This helps to explain price movements before the consensus change, which may reflect earlier revisions or other information that reaches the market. IBES consensus data is observed at a daily frequency and does not capture the exact timing of updates, which may contribute to the pre-event abnormal returns. Overall, the findings suggest that the observable consensus revision is not the primary point of information arrival.

The absence of post-announcement abnormal returns is consistent with semi-strong market efficiency, as prices appear to adjust without delay when the consensus recommendation becomes observable. From a practical perspective, the results suggest that investors following only published consensus upgrades are unlikely to earn abnormal returns. Investors following these recommendations should also carefully assess what these upgrades are based on, because analysts are often biased toward issuing positive recommendations. This may reflect career concerns and other related incentives. That said, the ability to exploit consensus measure revisions appears limited in practice. In addition, liquidity constraints, transaction costs, and bid–ask spreads further limit the possible exploitability of these strategies.

Several limitations of this study should be acknowledged. The decision to use consensus-level data may obscure the timing of individual analyst revisions, and the event study framework cannot fully isolate recommendation effects from other concurrent information. In addition, the results are based on the Finnish equity market and may not generalize to larger or more liquid markets. Another limitation is that multiple events are observed for the same firms, meaning that observations may not be fully independent at the firm level and may affect statistical inference.

Future research may examine individual analyst revisions in more detail to better identify the timing of information arrival and to compare these effects with consensus-level changes. The observed patterns may also differ across industries or market environments. Reactions may vary across analysts depending on their perceived credibility, although this may be more difficult to examine in smaller markets such as Finland.

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Appendices

Appendix 1 Declaration of the use of Artificial Intelligence (AI)

In the preparation of this thesis, generative artificial intelligence was used as a support tool at several stages of the research process. The author remains fully responsible for all content, analysis, and conclusions.

Tool used:
OpenAI ChatGPT (GPT-5.3)

Stages and purpose of use:
AI was used to support the following aspects of the research process:

- Ideation and research planning, including refining the research question and structuring the study
- Methodology and data analysis, particularly R programming (e.g., debugging code and improving script structure)
- Writing and editing, including improving clarity, structure, and academic tone

Example prompts:

- "Help debug this R code for abnormal return calculation in an event study."
- "How can I improve the clarity and academic tone of this paragraph?"

Verification:
All AI-generated outputs were critically evaluated before use. Academic sources were independently verified from original publications. All empirical analysis, model choices, and interpretation of results were conducted independently by the author.