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# Stock price reactions to analysts' recommendations

## Do analysts make a valuable contribution to price discovery?

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# Abstract

The aim of this thesis was to investigate if stock recommendations published by financial analysts make a valuable contribution to price discovery on the Swedish stock market. This was achieved by examining the abnormal returns for two time windows, the surrounding days of published recommendations and the next two weeks after publication. The complete data sample consisted of the 30 companies within the OMX STOCKHOLM 30 index, the stock recommendations made on them and their historical stock prices during the period 2006-2021. By applying an event study methodology, it was shown that buy and sell recommendations published by stock analysts do display cumulative abnormal returns over both time windows being investigated. Furthermore, that the published recommendations favor the information hypothesis as they proved to have valuable contribution to price discovery. The interaction variables *MarketCap* and *Turnover* were implemented to test if the price reaction to recommendation changes differs depending on size and liquidity. The results showed that larger sized firms will have smaller price reactions for downgraded recommendations. Whereas firms with higher liquidity show stronger price reactions for downgraded recommendations.

**Keywords:**

Stock recommendations, Efficient market hypothesis, Information hypothesis, Price pressure hypothesis, Cumulative abnormal returns

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# Contents

# 1. Introduction

Stock analysts are individuals typically employed by brokerage firms, investment firms or banks who devote large parts of their lives to learning, researching, and predicting a company´s future performance. Their job is to offer investors advice on stocks based on thorough research using available information, mostly financial data, on the operational performance of underlying companies and the likely future share price of their stocks. The best known format for analysts' advice includes recommendations on whether to buy, hold, or sell a certain stock.

Over the previous year there has been a significant increase of individual investors entering the stock market. To the average investor, the intricacies and development of local and global economic environments and different stock markets might appear too complex for them to believe that they can become efficient decision makers regarding investments in individual stocks. As a result of this complexity these types of investors will likely prefer to outsource the decision making to experts in the field, for example by subscribing to daily investment advice blogs or newsletters. Moreover, the lack of average investors' basic knowledge and time often lures them to follow the exact recommendations that the outsourced experts give. In these situations, the true motivations of the experts may not be transparent, a situation that often occurs in the interactions between investors and financial analysts.

The expert's motives have been discussed heavily in previous literature and the conclusions are diverse. Primarily the big question circles around the possibility of outperforming the strong form efficient market theory, which says that all equity is priced correctly according to the given private and public information. In contrast to the strong form efficient market theory, the majority of the professional investors disagree and argue that an active portfolio management can outperform a passive portfolio management (Grossman & Stiglitz, 1980). Clearly an alternative standpoint would question active management costs and most likely result in more severe regulations. The professional investors' argument however supports the semi-strong EMH where stock prices reflect all public information suggesting that stock analysts' recommendations include unknown information (Fama, 1978). This information may impact stock prices short-term or long-term. This impact has been examined through two hypotheses: the information hypothesis and the price pressure hypothesis.

The information hypothesis suggests that a stock analysts' recommendation is considered new public information, which has not been reflected in the stock price. For example, a buy recommendation on a stock from an analyst will have investors believe the stock is undervalued based on new information and are therefore more likely to buy or at least hold the stock rather than sell. This can lead to abnormal price increase and ultimately the information in the recommendation will be reflected in the stock price (Davies & Canes, 1978). The price pressure hypothesis poses that analysts recommendation will be a self-fulfilling prophecy meaning that investors believe the recommendation holds new information when it doesn´t. This again will lead to investors buying the stock which will lead to abnormal price increase. However, in this case the stock should eventually fall back as the recommendation had no real valuable new information supporting the price increase, therefore this should only have a short-term impact (Davies & Canes, 1978).

Looking at previous literature on this topic it was very noticeable that majority of them were done by investigating the US market. The main researchers regarding this topic were studies conducted by Womack (1996) "*Do brokerage analysts' recommendations have investment value"* and Davies and Cane (1978) study *"Stock prices and the publication of second-hand information"*. A number of literatures has been presented on this topic, however recent studies on this topic are limited.

The purpose of the thesis was twofold. First was to further investigate previous research and to investigate if analysts have made a valuable contribution to price discovery (support the information hypothesis) on the Swedish stock market, which was done by analyzing the stock market reactions to the publication of analysts' recommendation on *Bloomberg Terminal*. The second was to see how the impact of the recommendations have evolved over time. Both by comparing throughout the time period being investigated and to previous literature. This led to the following research question:

*Do analysts make a valuable contribution to price discovery?*

To answer the research question, a large data sample consisting of stock recommendations and abnormal returns on all 30 companies in the OMX Stockholm 30 index published in the *Bloomberg Terminal* between January 2006 and April 2021 are analyzed. The method used for answering the question was to use an event study methodology to perform our investigations. From that, cross-sectional regressions are performed on the observed

recommendations that varies in terms of; date of recommendation, analyst firm and direction of recommendation (buy/hold/sell).

The main findings for the twofold purpose of this thesis showed that both buy and sell recommendations are in favor of the information hypothesis as the results displayed significant abnormal returns for buy recommendations and abnormal losses for sell recommendations. As goes for the evolvement of the published recommendations being investigated. Throughout the time period the effect of recommendations published has decreased over the years for both buy and sell recommendation. This implies that the financial market is gradually becoming more efficient.

In the following chapters previous literature will be presented in Chapter *2 Literature review*, which will set the direction of the thesis. Furthermore, the methodology of the event study and the cross-sectional regressions are described in detail in Chapter *3 Methodology.* Chapter 4 *Data Sample,* presents the target market and the used dataset as well as descriptive statistics regarding the data. The results and analysis from the regression outputs are presented in Chapter *5 Results and Analysis.* Lastly, the concluding remarks are presented in Chapter 6 *Conclusion/Discussion.*

# 2. Literature review

## Efficient market hypothesis

The efficient market hypothesis (EMH) states that the current market share price reflects all the public known information to the investors (Fama, 1970). Consequently, the EMH assumes that stocks are always traded at a fair price. In other words, it is impossible for investors to trace undervalued or overvalued stocks. The theory poses that in the long-term no individual investor should be able to beat the market by generating abnormal returns using the information available. The reason behind the theory is that all available information relevant to a public firm will reflect fully into its stock price. Therefore, the only way to outperform a benchmark index is to take on higher risk (Fama, 1970)

According to Fama there exist three relevant subsets of market efficiency: the weak form, the semi-strong form and the strong form. Firstly, the weak form is based on historical information and prices. Historical information cannot be used to predict future prices in the market. Meaning that fundamental stock analysis should not be able to award abnormal returns because stock prices follow a random walk process. Secondly, the semi-strong form includes information that is publicly available. This form of the EMH states that all stock prices react to new fundamental information available to all individuals. The concern with the semi-strong market is how quickly stock prices are to adjust to new information, with groups of investors taking advantage of being ahead of the curve (Fama, 1970). Finally, the strong form considers situations where all information is available, not only all public information but private as well. This form would make it impossible for certain groups of individuals to take advantage of insider trading due to strong form of market efficiency. In conclusion Fama's hypothesis confirms, with only a few exceptions, that the efficient markets model stands up well to all presented forms.

Following the publication of the EMH, plenty of research has been done on the topic, in particular whether it is possible for investors to beat the market. In contrast to EMH, Barber et al. (2001) argues that it is possible to receive significant positive abnormal returns if you actively rebalance your portfolio. In order to receive the abnormal returns a daily rebalance strategy is required which will result in high turnover rates. Furthermore, they argue that the market is semi-strong inefficient which means that the transactions costs will eliminate the suggested significant abnormal returns. Womack (1996) argues that as long as the expected

gain is higher than the management fee investors should proceed with expert's recommendation.

## Biases in stock recommendations

There are certain biases in stock recommendations and one is the possible conflict of interest between a financial organization and related analysts' stock recommendation. At times a financial organization is the lead underwriter and sales organization for a new equity issuing for a public company. In most cases the lead underwriters have analysts working for them that give recommendations for the newly issued equity (Agrawal & Chen 2003). Michaely and Womack (1999) found as well that analysts employed by the lead underwriters for new equity issued tend to give stronger recommendations compared to the other analysts following the stock. A settlement was made between the ten largest investment banks and the U.S. financial regulators to overcome this conflict of interest. This led to the separation of investment banking and analysts research department, where a different conflict of interest arose. Following the settlement and new regulations Kadan et al. (2009) found that analysts employed by leading underwriters with relations to the firm issuing new equity were less optimistic and more informative of the event.

Another bias in stock recommendations which can be seen through previous literature is that the majority of published recommendations are biased towards a buy rating, with buy recommendations being more favorable from investors' perspective. Jegadeesh et al. (2004) collected all recommendations from *Zack´s Investment Research* database from 1985 to 1997. Where each recommendation is assigned a numerical rating (1 = strong buy, 3 = hold, 5 = strong sell). Overall, it showed that only five percent of the ratings were given a sell or a strong sell and the average rating over the whole period was towards a buy recommendation. Another study by Jegadeesh and Kim (2006) evaluates the value of recommendations in the Group of Seven (G7) industrialized countries from 1993 to 2002. They began by examining the distribution of the recommendations, which displayed a much higher frequency of buys and strong buys compared to sell and strong sell in all countries. The US had the least amount of sell recommendations with buy recommendations four to five times more frequent. To add to this, Womack (1996) found in his study that there are around seven times more buy recommendations than sell recommendations.

## Stock price reaction around publication day of recommendations

One of the early research papers published on stock price reaction to analysts' recommendations was by Davies and Canes (1978). They investigated the effects of the "Heard on the Street" column in *The Wall Street Journal* and how stock prices reacted to the publication. "Heard on the Street" was a column in *The Wall Street journal* where analysts working on Wall Street published their recommendations on stocks they had been researching and scrutinizing most recently for their subscribers. Their sample consisted of 597 buy recommendations and 188 sell recommendations from the column over the years 1970 and 1971. The results of their study showed that on the day of publication/event day (t = 0); buy recommendations led to an average abnormal return of 0,923%, whereas sell recommendations had negative average abnormal return of -2,374%. After the event day (t > 1) abnormal returns are not significant. The sell recommendations have a significantly stronger impact on stock prices in this study. Other researchers such as Liu et al. (1990) and Beneish (1991) did similar studies on the "Heard on the Street" column and its impact on stock prices. Both of their results supported Davies and Canes result with significant abnormal returns on event day as well as small abnormal returns two days prior of event day. He suggests that the abnormal returns on stock prices days prior to event day are due to information leaking (p. 396).

The column "Inside Wall Street" in *Business Week* has been studied by a number of researchers, where a sample of stock recommendations are collected from the column and the returns as well as the volume of trades made on publication day. Palman et al. (1994) examined the trading volumes after publication of security analyst's recommendation and its price reaction. Their conclusion suggests that the publication increases the trading volume on stocks with a buy recommendation, however not for stocks with a sell recommendation. The abnormal returns following the increased trading volume support the view that price adjustments in the market don´t happen instantaneously as new information comes to light, rather that stock prices react depending on the time pattern for the market to access the new information.

## Information hypothesis vs price pressure hypothesis

Research over the past decades has led to hypotheses regarding the reactions after analysts' recommendations are published. The two main hypothesis that have been proposed in past literature as to why there are significant reactions after stock recommendations are published are the information hypothesis and price pressure hypothesis.

The information hypothesis poses that the published stock recommendation contains valuable information regarding the stock that was not reflected in the stock price before the recommendation. The information contained in the recommendation can be either new information that has not been publicly available, which rejects strong EMH, or the analysis of public information that is already reflected in the stock price being undervalued (overvalued) (Foster, 1979; 1987). The abnormal returns after recommendation that have been published should not revert back since the information is valuable and reflects the stock price.

Womack (1996) examined both short-term and long-term abnormal returns after analysts' recommendations. He drew the conclusion that analysts' recommendations have a permanent effect on a stock price as in not mean reverting. This implies that the recommendation manifest economically valuable information, which supports the information hypothesis (p. 139). Where his findings showed significant abnormal returns one month after published buy recommendations with average abnormal returns being 2,4% and for sell recommendations 6 months later post recommendation -9,1%.

The price pressure hypothesis indicates that after a recommendation is published an increase in activity ignites around the stock with the buy (sell) recommendation despite the likelihood of the recommendation having no valuable information. This means that investors will start buying (selling) the stock with equity flowing in (or out). This buying (selling) pressure on the stock in question will push its price up (down) leading to abnormal returns (losses). When the pressure cools down over time and no economically valuable information has been published the stock price will revert to its original price prior to the recommendation. This reversion happens eventually because in the long-term stock prices are determined by a firm's cash flow.

Barber and Loeffler (1993) examined the impact of the "Dartboard" column in *The Wall Street Journal* where investment analysts make recommendations on randomly selected stocks. After examining price reactions from event day to day 25 their results displayed significant abnormal returns from event day to day 2 with an average of 4,06%. The period from day 2 to day 25 showed a negative abnormal return with an average of 2,08%. This supports to an extent both information and price pressure hypothesis with the reversion not complete, therefore neither hypothesis can be rejected. Liang (1999) examined the "Dartboard" column as well but extended the observed period from 25 days to 125 days. Liang´s results showed significant abnormal returns from event day to day 2 with an average

of 3,52%. The next 15 trading days showed a strong mean reversion with equity flow decreasing significantly and by day 53 after publication reversal of abnormal returns were complete (p. 124). Liang´s conclusion fully rejected the information hypothesis with initial abnormal returns due to strong reaction from investors supporting the price pressure hypothesis.

Kerl and Walter (2007) performed a study on buy recommendations on stocks in The German stock market published by magazines from 1995 to 2003. Their results were consistent with Barber and Loeffler (1993) with both evidence of information and price pressure hypothesis. Instant reaction after publication of buy recommendations showed abnormal returns of 2,58% and towards day 20 post publication showed a reversion of -1,04% due to pressure slowing down. Meaning the information contained behind the recommendation delivered a permanent abnormal return of 1,54%.

### Different reactions between buy and sell recommendations.

From what can be gathered from the previously mentioned work from both Womack (1996) and Jegadeesh et al. (2004), is that there seems to be a strong bias towards buy recommendations from stock analysts. This suggests that analysts are more reluctant to publish sell recommendations. Womack (1996) went further saying that due to the rare occasion of a sell recommendation it may be inferred that they carry more information. The results support his view since sell recommendations had significantly larger abnormal reactions compared to the buy recommendation within his study. Davies and Canes (1978) results from the study mentioned above show the different price reactions to buy recommendations compared to sell recommendations and also clearly support Womack´s theory with sell recommendations having over two times higher abnormal reaction than buy recommendations.

The levels of rating given by analysts are divided into five categories with 1 (Strong Buy) the most highly recommended stock and 5 (Strong sell) the least favorable stock. Barber et al. (2001) estimated the abnormal returns that can be earned from stock analysts´ recommendations from 1986 to 1996 using *Zacks Investment Research* database. Their summary showed that a portfolio with the strongest buy ratings provided an average annual abnormal gross return of 4,13%, while the portfolio with the least favorable stocks with a short sell rating provided an average annual abnormal gross return of -4,91%. The difference

here between the impact of buy and sell recommendations again supports Womack´s argument of sell recommendations having more information.

This asymmetry between reaction to buy and sell recommendations has proven to be parallel to other events that impact stock prices. Events such as earnings announcements, dividend payments and change in credit ratings have proven to have a clear difference in price reaction when comparing good announcements compared to bad announcements, with bad announcements having significantly stronger negative impact on the stock price than good announcements. Iqbal et al. (2011) performed a study on stock price reaction to earnings announcement. They employed 5-year data on stock prices from 2004 to 2008 for 114 listed firms mainly. Their findings showed that there is a bigger element of surprise in bad news than in good news as the impact from bad news were stronger. Similar findings were found by Ursula et al. (2017) regarding dividend announcements where a decrease in dividend had a stronger negative impact on a stock price compared to an increase in dividend.

# 3. Methodology

In order to investigate whether analysts provide accurate stock recommendations we will perform cross sectional regressions on several recommendations that vary across; date of recommendation, analyst firm and direction of recommendation (buy/hold/sell). As we aim to cover the Swedish stock market the recommendations will also cover different sectors. Furthermore, it was also of interest to investigate the distribution of the recommendations, as previous studies conclude that analysts are more reluctant to give sell recommendations.

As the events happen sporadically throughout the period, an event study methodology was used to perform our investigations. As our perception was that the recommendations will have a significant effect in the short term but a questionable effect in the long-term different time windows was investigated.

## Event study

To investigate whether analysts can provide accurate stock recommendations, abnormal returns will be identified by comparing stock returns to a benchmark. The basics of an event study is to predict the return of a security as if the event never happened and compare that return to the actual return (Brown & Warner, 1980). As stock recommendations occur sporadically there will not be a common event date for the different firms. An event study allows the events to happen independent of each other and is therefore a suitable method when investigating how stock prices respond to new information (Fama et al., 1969). According to Korthari and Warner (2008), the event study methodology can be used as a way of testing the efficient market hypothesis by looking at abnormal returns.

As several firms cover the same companies, various recommendations will be published throughout the years. Therefore, we have decided to narrow down our event window, due to the frequency of new recommendations, which cause an overlap problem. Campbell et al. (1997) describes how shorter event windows are more reliable as there are several factors that affect the long-term price of a security and not only a specific event.

To use an event study, it is vital to define the events and the related time window, (Bowman, 1983). As this thesis examines whether stock analysts provide accurate stock recommendations the events are centered around the publication day of the recommendations. As Stickel (1995) claimed that there exists a pre-event drift due to information leakage we have decided to also include a few days prior the actual event. In the cross-sectional data set, each event represents the publication date of an analyst's recommendation where the time

window was either two days prior the event to two days after the event, or two days prior the event to twelve days after the event. By considering two windows the thesis aims to better answer whether the market is efficient or not.

## Abnormal and normal returns

As the event study investigates the effect of the events it was central to calculate the actual return in contrast to a "normal return", which was the expected return if the event had not taken place in the first place. The abnormal return can therefore be simplified as the difference between the actual return and the expected normal return (Fama, 1998).

There are several ways to calculate abnormal returns and the most common way is the market model (Brown & Warner, 1985). Fama (1998), claims that the market model is a suitable model when investigating abnormal returns due to company specific events. The market model calculates the expected return as below where the residual is the unexplanatory part of the equations, which in turn is the abnormal return.

$$R_{it} = a_i + B_i R_{mt} + e_{it} \quad (1)$$

In the market model the abnormal return is equal to; the intercept of the estimation window, the slope of the estimation window, the return on the market index and lastly the residual. The model can therefore be simplified by rearranging the parameters as follows.

$$AR_{it} = R_{it} - (a_i + B_i R_{mt}) \quad (2)$$

Despite the benefits of the market model Barber and Lyon (1997) advocates an adjusted market model where the parameters $a$ and $B$ are set equal to 0 and 1. In contrast to the market model the adjusted market model is not depending on historical data, such as an estimation window. By eliminating the dependency of historical observations, we can reduce the overlap dilemma and therefore lower the unexplanatory noise. As the adjusted market model sets $a$ and $B$ equal to constants we can simplify the expression as below.

$$AR_{it} = R_{it} - R_{mt} \quad (3)$$

To finally summarize the adjusted market model, the returns of the securities and the market index have been calculated by taking the natural logarithm difference of two successive daily official closing prices.

$$R_t = Ln(\frac{P_t}{P_{t-1}}) \tag{4}$$

The log-return approach is widely used in the finance sector and has several benefits to the arithmetic return. It can for example easily be added across time periods and converted back into simple returns. Another advantage is that log returns never go below zero and have the benefit of following a normal distribution (Danthine & Donaldson, 2014).

## Cumulative Abnormal returns

The abnormal returns have been calculated, as argued above, by using the adjusted market model. In addition to the calculation of the abnormal returns, our dependent variable considers the total abnormal return for a specific event window. As we have two different event windows, two days prior the event to two days after the event and two days prior the event to twelve days after the event, we have two different dependent variables, one for each set of regression. The cumulative abnormal return adds all the abnormal return over the specific event window and encourages the investigator to determine whether the effect increases or decreases over time (Danthine & Donaldson, 2014).

$$CAR_i = \sum AR_{it} \tag{5}$$

## Regression Specifications

By looking at analysts' stock recommendations this thesis examines whether stock recommendations can account for abnormal returns. To investigate the issue a combination of dummy variables represents the different types of recommendations. As mentioned in the data section there exist ten different kinds of recommendations and we analyze each one of them.

$$CAR_i = \beta_0 + \beta_1 New\ Buy + \beta_2 New\ Hold + \beta_3 New\ Sell + \beta_4 Buy\ to\ Hold + \beta_5 Buy\ to\ Sell + \beta_6 Hold\ to\ Buy + \beta_7 Hold\ to\ Sell + \beta_8 Sell\ to\ Buy + \beta_9 Sell\ to\ Hold + \beta_{10} Drop \quad (6)$$

As the equation only exists of dummy variables it is only the intercept that will be adjusted, which requires us to omit one of the dummy variables. That is because one of the categorical variables will act as a reference group, which basically signifies that one dummy variable is redundant and therefore if it is not omitted the prediction will be wrong (Kennedy, 2008). Therefore, the variables *DROP* or *SELL,* depending on the data, will be dropped and act as the intercept.

Furthermore, a standpoint was made on whether market capitalization (*MarketCap)* and turnover ratio (*Turnover*) have an impact on the size of the recommendation effect. To investigate the relevant question the initial equation adds an explanatory variable alternately with the associated interaction terms, where *MarketCap* or *Turnover* act as explanatory variables, as can be seen in *formula 7* and *8*. As we are interested in the total effect of *MarketCap* and *Turnover* it was of importance to include the interaction terms and not only the explanatory variables themselves. By doing so it was possible to tell the exclusive impact *MarketCap* and *Turnover* have on each type of recommendation (Peter, 2008).

$$CAR_i = \beta_0 + \beta_1 Dummy_{it} + \beta_2 Marketcap_t + \beta_3 Dummy_{it} * Marketcap_t \quad (7)$$

$$CAR_i = \beta_0 + \beta_1 Dummy_{it} + \beta_2 Turnover_t + \beta_3 Dummy_{it} * Turnover_t \quad (8)$$

To further investigate the impact of recommendations the types of recommendations will be sorted into different groups such as; *BUY, HOLD* and *SELL*.

## Statistical tests

In this section potential econometrical problems and solutions to these problems will be discussed.

### Multicollinearity

Multicollinearity occurs when two or more explanatory variables are highly correlated with each other. Therefore, when implementing additional explanatory variables, it was of importance to ensure that they do not suffer from multicollinearity which in turn can undermine the statistical significance of an independent variable. In general, it can lead to a wider confidence interval which in turn results in a less reliable output (Danthine & Donaldson, 2014). To control for multicollinearity a correlation matrix was employed as a sufficient test and will be presented in the result section. Previous studies argue that a correlation of -0,8/0.8 and below/above suffers from multicollinearity where one potential solution is to drop one of the highly correlated variables as they most likely explain the same thing (Westerlund, 2005).

### Heteroscedasticity

Heteroscedasticity occurs when the variance of the error terms is not constant. As heteroscedasticity means unequal scatter one usual approach is to plot the residuals in a scatter plot and look at the distribution. However, as the scatter plot gives a visual understanding rather than a significant result a common approach is to complete the evaluation with a Breusch-Pagan or a Whites test (Dougherty, 2016).

If heteroscedasticity is detected it will have severe effects on the statistical significance of the regression. As the estimator remains unbiased the estimated standard errors are wrong. An incorrect standard error will present a false p-value which is one of the few main outputs from a regression. To deal with heteroscedasticity several statistical software, including Stata, offer a “ROBUST” command which adjusts the standard errors for heteroscedasticity. Which in turn will predict an accurate p-value (Varbeek, 2017).

# 4. Data

## Data sample

The data used in the analytical work for this thesis are historical stock prices and analysts' recommendations for a particular set of stocks retrieved through *Bloomberg Terminal*. The firms or stocks defining the dataset are all the stocks of the 30 firms within the OMX Stockholm 30 index (OMXS30) traded on the Stockholm stock exchange. The firms can be seen in *Table 3* in the appendix. The data collected on these stocks include the historical prices on each firm and the market index as well as analysts' recommendation consensus ratings for each firm from 2006 to 2021. A recommendation consensus rating is a rating from 1 to 5, where 1 is a strong sell and 5 a strong buy. It presents the number of analysts following the stock as well as where they stand recommendation wise. This historical data of analysts' recommendations provides the total number of analysts following a particular stock and every change of recommendation over the time period, with three different levels of ratings; buy, hold or sell. When investigating abnormal returns the stock's performance will be compared to the OMXSPI index. The reason for choosing OMXSPI was to compare individual stocks or a subsection of the Swedish stock market to the full perspective of the Swedish stock market where only Swedish firms operating to a large extent in a similar economic and regulatory environment are being investigated. In comparison, the OMXS 30 benchmark would have too strong of a correlation to the underlying stocks and subsections, rendering the results harder to interpret.

## Variables

Once the data had been collected a few things needed to be considered before tests and analysis could be performed. The dummy variables used are effectively the change in analysts' recommendations, for example when an analyst changes his recommendation from a hold to buy *(FROMHOLDTOBUY)* this would be an event that was investigated. The total amount of dummy variables, or types of an event, are ten in addition to two explanatory variables which are used to control for the different size and liquidity of companies. In addition, the interaction terms of the dummy variables and the explanatory variables where used to analyze if the impact of an event differed depending on the size and liquidity of the firm.

The firm characteristics *MarketCap* and *Turnover* ratio are used as explanatory variables, as mentioned before they allow the event study to analyze if a firm's stock price is more

sensitive depending on its size. A firm's market capitalization that is listed on a stock exchange is simply calculated by multiplying its outstanding shares with the price of its stock. This allows investors to understand the size of the firm by comparing it to other listed firms. In the data, the market capitalization used was from the same date as the published recommendation.

The turnover ratio used was the turnover over market capitalization. This ratio is basically the total amount traded in the security´s currency (per day) divided by the total value of all its shares. Same goes for the turnover ratio for each observation where the turnover and market capital used are from the same date as each recommendation. To make sure these two variables do not suffer from multicollinearity a correlation matrix was executed and as can be seen in *Table 1* the two variables do not suffer from multicollinearity.

*Table 1: Correlation Matrix*

| Correlation Matrix | MarketCap | Turnover |
|---|---|---|
| MarketCap | 1 | -0,41 |
| Turnover | -0,41 | 1 |

The dummy variables are as follows: there are three new recommendations as in *NEWBUY*, *NEWHOLD* and *NEWSELL*. This is when a new analyst has started to follow a certain stock. Then there is a change in recommendation which are six in total, *FROMBUYTOHOLD, FROMBUYTOSELL*. *FROMHOLDTOBUY, FROMHOLDTOSELL, FROMSELLTOHOLD* and *FROM SELLTOBUY.* These changes are simply when a current analyst changes their opinion on a certain stock from a previous one, which can be due to a number of reasons such as updated fundamental analysis, new information regarding the stock or economic reasons. The last dummy variable is the event of a *DROP*, which is when a current analyst following a stock decides to remove their recommendation and stop following it. Since one dummy variable was dropped per dummy group alongside with a non-alarming correlation, the multicollinearity dilemma was not considered among these variables.

Depending on whether the data suffers from heteroscedasticity it must be treated in different ways. By performing a Breusch Pagan-test an acceptance or rejection were made of the null hypothesis of no heteroscedasticity (homoscedasticity), as can be seen in the *Table 2*. A

common pattern among the outputs was the existence of heteroscedasticity when the dummy variables are non-grouped and/ or include the interaction terms.

*Table 2: Breusch Pagan test*

| ***Breusch Pagan test*** | | | |
|---|---|---|---|
| *Reg Nr.* | Acc/ Rej | *Reg Nr.* | Acc/ Rej |
| 1 | H1** | 12 | H0 |
| 2 | H1*** | 13 | H0 |
| 3 | H0 | 14 | H0 |
| 4 | H0 | 15 | H0 |
| 5 | H0 | 16 | H0 |
| 6 | H0 | 17 | H0 |
| 7 | H0 | 18 | H0 |
| 8 | H1*** | 19 | H0 |
| 9 | H1*** | 20 | H0 |
| 10 | H1*** | 21 | H0 |
| 11 | H1*** | | |

**, **, *** indicates significance at the 90% , 95%, and 99% level, respectively.*

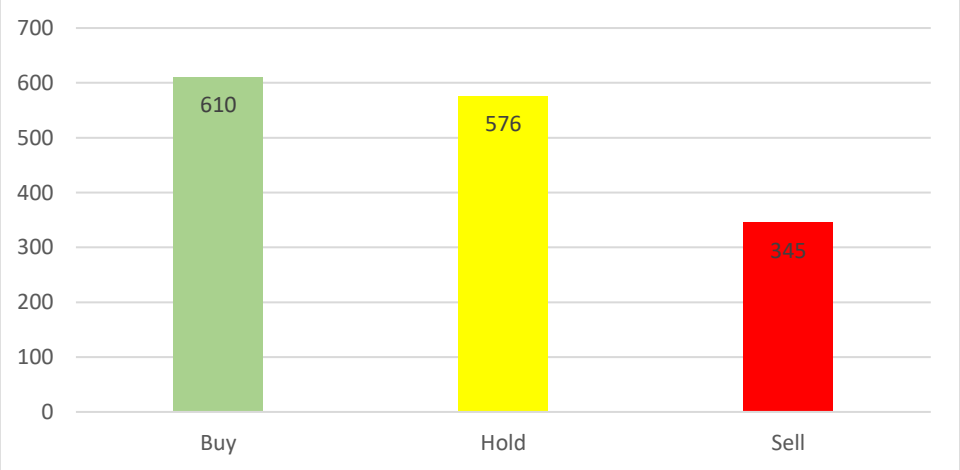
## Sample selection

A regression analysis was performed on the data set using the aforementioned dummy-, explanatory- and interaction variables. When performing the regressions, both a short-term and long-term event window was used. Where the short-term window looking at the returns two days prior to the recommendation (event) until two days post event and the long-term window covering two days prior to the event until twelve days after the event. Given how frequently recommendations change for a number of the firms there could be some contamination of overlapping events within any given event window. Consequently, overlapping events were excluded from the data. The reason for this exclusion was to avoid measurement errors, for when another event happens within a given event window it will affect the average abnormal returns of the event window. Analysts' recommendation changes published on trading days only were used in the data, meaning all recommendations published on weekends or public holidays were excluded.

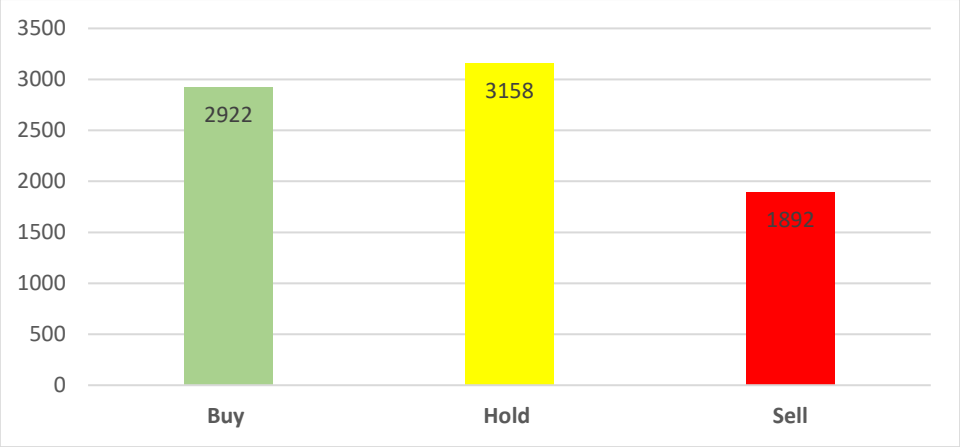
Substantial work needed to be done in our data to be able to perform our regressions. To begin with, the events that had to be excluded were removed. Before any exclusion the data included 9711 observations. After removing all observations, fulfilling the requirements mentioned before, the short-term event window (two days prior to two days post event) contained 7510 observations. As for the long-term event window (two days prior to twelve days post event) the observations decreased tremendously to 1896 observations. For each observation, their abnormal return/loss for all days of the event window as well as their cumulative abnormal return of the whole event window where calculated. In majority of the regression outputs, the short-term regressions will contain a larger number of statistically significant coefficients in comparison to the long-term regressions. A possible reason for this is because the short-term period has considerably more observations, since there a lot fewer overlaps of stock recommendations.

## Distribution

As mentioned before, the data sample consists of ten different dummy variables that are recommendation changes. However, when stock analysts make a recommendation change, they have a new recommendation standing that is buy, hold or sell. Previous literature has shown that stock analysts are biased towards publishing buy recommendations. As can be seen in *Column charts 1 and 2* this bias remains considering the Swedish stock market, in the sense that there is a clear bias against sell recommendations compared to hold and buy recommendations.

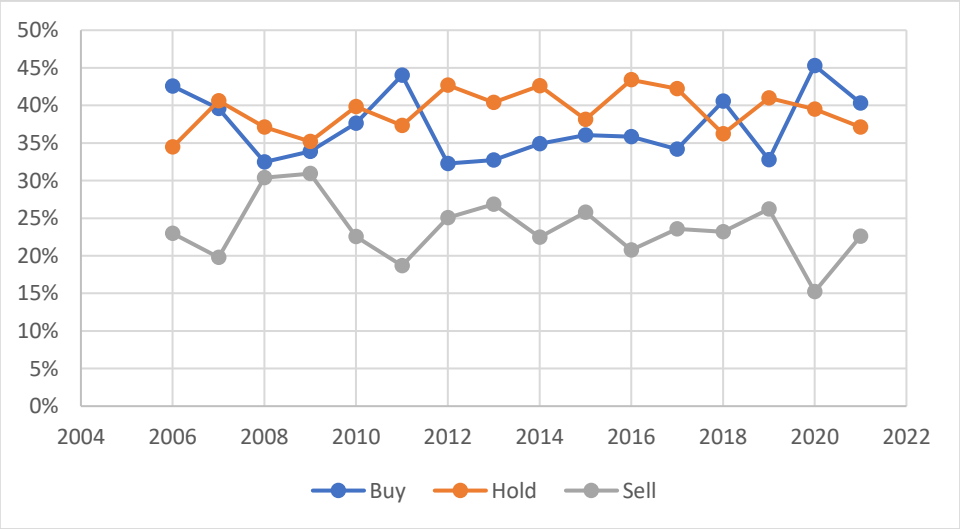



*Column chart 1: Standings of recommendations in the short-term period*



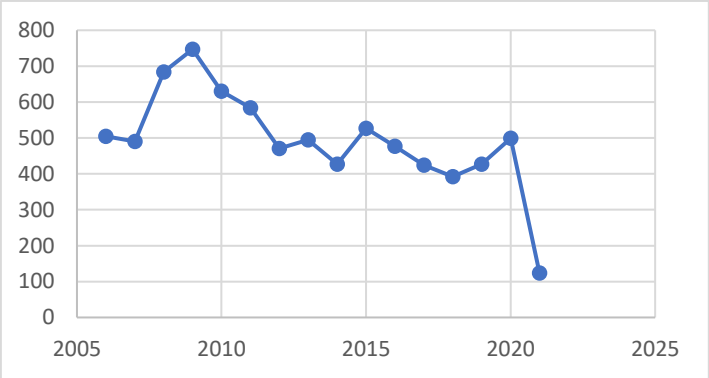

*Column chart 2: Standings of Recommendations over the long-term period*

To further analyze time's impact on stock recommendations *Line chart 1* provides the historical distribution of stock recommendations using the sample from the short-term period. The chart confirms findings in the previous literature section where it says that analysts are more biased against sell recommendations as they are significantly less frequent compared to buy or hold recommendations. The exception to this was during the years of 2008 and 2009, the period of the financial crisis. This period saw a much closer frequency of sell recommendations to buy recommendations, even though the latter are still more frequent. This shows that even when the financial market was crashing, analysts are still favoring buy recommendations, which demonstrates the level reluctance stock analysts have on publishing sell recommendations.




*Line chart 1: Distribution over time*

Furthermore, to have a clear picture of the distribution it was also of interest to look at the annual amount of stock recommendations and whether the frequency has changed over time. *Line chart 2* shows that the number of recommendations has declined over the years and peaked in 2009 shortly after the financial crises. It was worth noting that both the amount of stock recommendations and the frequency of sell recommendations peaked right after the financial crises in 2009. The massive drop in 2021 was partly misleading since the time period only accounts for a subpart of the full year.




*Line chart 2: Yearly amount of stock recommendations*

# 5. Results and analysis

The result section will present the result of our performed regressions after multicollinearity and heteroscedasticity have been controlled for. Additional charts and tables that cover the data sample will also be illustrated which should foster deeper understanding to the reader.

The regression outputs are 21 in total, where different time periods, explanatory variables and dummy groupings are considered to get a wider understanding of the true effect of stock recommendations. To ease the understanding of the outputs the results are divided into three subchapters. The first subchapter covers exclusively the impact stock recommendations have on abnormal returns. This was achieved by testing the stock price reaction after a change in recommendation has been made. In addition, a complementing regression was performed to simplify the readability and enlarge the dataset. Ten different represented dummy variables are grouped into the three standard recommendations *BUY, HOLD* and *SELL*. Furthermore, regressions are run by splitting the dataset into three different time periods, which are 2006-2010, 2011-2015 and 2016-2021, to see if stock recommendations impact have changed over time.

The second subchapter will perform similar regressions to the first subchapter but investigates whether *MarketCap* affects the impact. Lastly, the third subchapter shares the same purpose as the second one but investigates the effect of *Turnover* rather than *MarketCap*.

## How different types of recommendation affect the abnormal returns.

The first two regressions use the short-term and long-term CAR as dependent variables and have the ten different types of recommendations as dummy variables. As can be seen in *Regression 1* and *Regression 2*, the dummy variables' significance varies over the two different time periods.

When looking at *Regression 1* the days surrounding the event seem to have some evidence of abnormal returns. The results show that all buy recommendations have positive coefficients where the greatest effect appears to be when a hold recommendation upgrades to a buy recommendation, which has a CAR of 1,07% that was statistically significant at the one percent level. The hold recommendations seem to have a more unpredictable nature. Based on the results in *Regression 1* hold recommendations have a substantial impact on stock prices, yet no clear direction can be identified because a hold recommendation can be either

an upgrade, downgrade or a new one. All the sell recommendations have a negative effect on abnormal returns, where a downgrade from a hold position has the greatest effect.

The most significant impact occurs when recommendations are downgraded. In *Regression 1* *FROMHOLDTOBUY* has a CAR of 1,07% over the short-term period. Whereas *FROMHOLDTOSELL* has a CAR of -1,44% with both outcomes statistically significant at the one percent level. Further, *NEWBUY* has a CAR of 0,41% and was statistically significant at the five percent level and while *NEWSELL* has a CAR of -1,08% that was statistically significant at the one percent level. This supports previous theories on how sell recommendations have stronger impact on price reactions compared to buy recommendations.

In the long-term regression, as can be seen in *Regression 2*, the dependent variable takes on the long-term CAR value. In contrast to the first regression, four fewer outputs are significant under the 90% significance level. Despite the different significance it seems that there has not been a major change in the total effect on the dependent variable. What was noticeable was that the downgrade recommendations are the ones that are statistically significant at the 1 percent level, this again suggest a strong impact on stock prices. Where *NEWSELL*, *FROMBUYTOHOLD* and *FROMHOLDTOSELL* display a CAR of -1,66%, -1,25% and -1,4%. This supports the theory of bad news having stronger impact compared to good news considering that the only upgrade that had statistical significance was *FROMHOLDTOBUY* at the 5 percent level has a CAR of 1,04%.

A change in recommendation has a significant impact no matter if it ends up being a buy, hold or sell recommendation.

*Regression 1: Analyst's recommendations impact on abnormal returns in the short-term*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| NEWBUY | 0,38** | (0,16) |
| NEWHOLD | -0,41** | (0,19) |
| NEWSELL | -1,08*** | (0,22) |
| FROMBUYTOHOLD | -1,12*** | (0,16) |
| FROMBUYTOSELL | -0,5** | (0,24) |
| FROMHOLDTOBUY | 1,07*** | (0,15) |
| FROMHOLDTOSELL | -1,44*** | (0,18) |
| FROMSELLTOHOLD | 0,42** | (0,18) |

*Regression 2: Analyst's recommendations impact on abnormal returns in the long-term*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| NEWBUY | 0,59 | (0,42) |
| NEWHOLD | -0,42 | (0,5) |
| NEWSELL | -1,66*** | (0,49) |
| FROMBUYTOHOLD | -1,25*** | (0,37) |
| FROMBUYTOSELL | 0,32 | (0,61) |
| FROMHOLDTOBUY | 1,04** | (0,41) |
| FROMHOLDTOSELL | -1,4*** | (0,44) |
| FROMSELLTOHOLD | 0,26 | (0,48) |

| | | |
|---|---|---|
| FROMSELLTOBUY | 0,25 | (0,22) |
| Constant | 0,13 | (0,1) |
| R-Squared | 0,043 | |
| No.observations | 7510 | |

*From now on, robust standard errors are reported in parentheses. *, **, *** indicates significance at the 90% , 95%, and 99% level, respectively.*

| | | |
|---|---|---|
| FROMSELLTOBUY | -0,84 | (0,58) |
| Constant | 0,22 | (0,25) |
| R-Squared | 0,031 | |
| No.observations | 1896 | |

By reviewing *Column chart 3* to compare the short-term CAR with the long-term CAR, it was obvious that the effect seems to be constant over time with only a few outliers. It was hard to compare the outputs given in *Regression 1* and *Regression 2*, due to several of the coefficients possessing statistical significance of higher than 10 percent. Nonetheless, the results do suggest that the CAR stays constant from the short-term period to the long-term period. The only outliers are *FROMSELLTOBUY* and *FROMBUYTOSELL* which do not possess statistical significance under the 10 percent level. This further suggests that the published recommendations made by the analysists do contain some valuable information regarding the stock, which supports the information hypothesis to a certain level of extent. On the other hand, there was no clear sign of price reversals in the long-term, which indicates that the price pressure hypothesis can be rejected. Overall, there are clear signs of abnormal returns, which rejects the strong form of the efficient market hypothesis.


*Colum chart 3: Short-term vs Long-term*

## How a narrower recommendation grouping affects abnormal return.

In contrast to previous regressions, the following regressions will split the original recommendations into three categories of recommendations, *BUY*, *HOLD* and *SELL*. By doing so, it will be easier to grasp the overall result and each group will have more observations, which should increase the significance of the results (Dougherty, 2016). According to *Regression 3* and *Regression 4*, all the grouped recommendations have a significant effect on impact except the long-term *HOLD* recommendation and all the coefficients have expected signs. It was also clear that all the coefficients decrease over time which corresponds to the EMH.

*BUY* recommendations in the short-term period show that they deliver a CAR of 1,83% and in the long-term period it decreases to 1,63% which was a slight reversal from the two days after event day to twelve days after event day. The surprise from *Regressions 3* and *4* was that sell recommendations have significantly lower impact on the stock price than buy recommendations. This was contrary to the results from *Regressions 1* and *2* and past results in the literature review. Sell recommendations also show a slight reversal where the CAR went from -0,99% in the short-term to -0,86% in the long-term period. This reversal was not significant enough to support or reject the price pressure hypothesis. However, these results do have enough evidence to support the information hypothesis again.

*Regression 3: Recommendations standing in the short-term.*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 1,83*** | (0,13) |
| HOLD | 0,57*** | (0,13) |
| Constant | -0,99*** | (0,11) |
| R-Squared | 0,035 | |
| No.observations | 6109 | |

*Regression 4: Recommendation's standing in the long-term.*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 1,63*** | (0,33) |
| HOLD | 0,42 | (0,33) |
| Constant | -0,86*** | (0,25) |
| R-Squared | 0,018 | |
| No.observations | 1531 | |

## Has the impact of stock recommendations changed over time?

Although previous regressions have used the same time periods from 2006 to 2021. The following regressions divide the years in three different intervals, 2006-2010, 2011-2015 and 2016-2021. By doing so it was possible to see if the effect has changed over time. Based on the results in *Regressions 5*, *6* and *7*, all the outputs are significant, and all the coefficients

have expected signs. Moreover, the effect decreases over the years for both *BUY* and *SELL* recommendation, whereas *HOLD* recommendations have a more unpredictable behavior. Based on the results one can argue that the market has gradually become more efficient.

*Regression 5: The affect analysts' stock recommendations had on abnormal returns in 2006-2010*

| *Examined variable* | *Coeff.* % | *Std.Err* % |
|---|---|---|
| BUY | 2,15*** | (0,32) |
| HOLD | 0,62** | (0,31) |
| SELL | - 1,11*** | (0,25) |
| R-Squared | 0,039 | |
| No.observations | 1797 | |

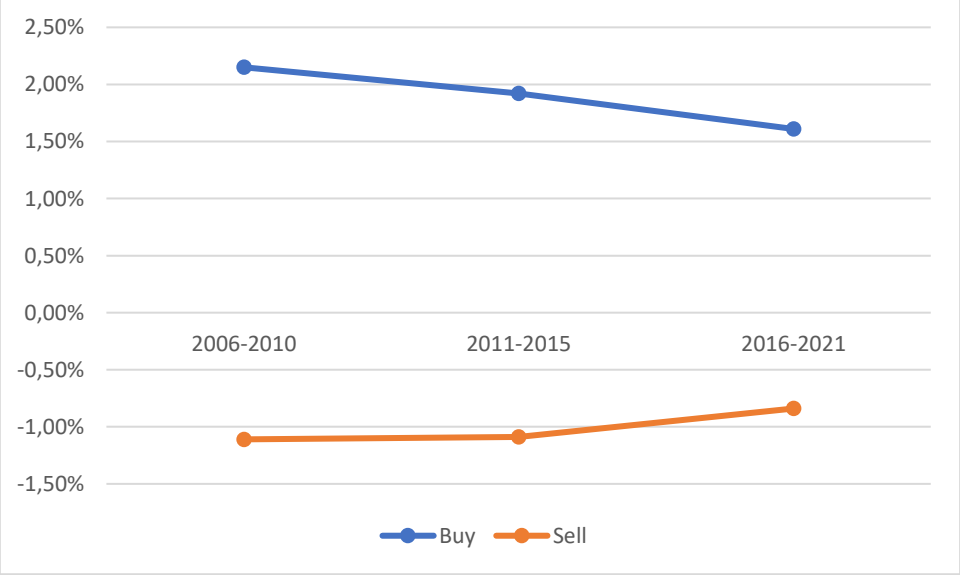
*Regression 6: The affect analysts' stock recommendations had on abnormal returns in 2011-2015*

| *Examined variable* | *Coeff.* % | *Std.Err* % |
|---|---|---|
| BUY | 1,92*** | (0,19) |
| HOLD | 0,73*** | (0,21) |
| SELL | -1,09*** | (0,22) |
| R-Squared | 0,046 | |
| No.observations | 1845 | |

*Regression 7: The affect analysts' stock recommendations had on abnormal returns in 2016-2021*

| *Examined variable* | *Coeff.* % | *Std.Err* % |
|---|---|---|
| BUY | 1,61*** | (0,22) |
| HOLD | 0,41* | (0,21) |
| SELL | -0,84*** | (0,21) |
| R-Squared | 0,025 | |
| No.observations | 1923 | |

*BUY* recommendations abnormal returns are slowly declining throughout the years, as the CAR declines from an excessive 2,15% in the time interval 2006 and 2011 and gradually goes down to 1,61% in the latest time interval from 2016 to 2021. This could suggest that the market is moving more towards a strong form of EMH. Sell recommendations display similar results with the negative price reaction diminishing over the three intervals with the CAR going from -1,11% for the first-time interval to -0,84% for the latest time interval. *Line chart 3* shows how the abnormal returns and losses move steadily towards zero.




*Line chart 3: Efficiency over time*

## *MarketCap's* impact on abnormal returns.

The regression outputs in *Regression 8* and *9* include the additional explanatory variable *MarketCap* with associated interaction variables. From what can be seen in *Regression 8* the short-term period downgrade recommendations are the only results that are statistically significant. This result suggests that there was strong evidence of *MarketCap* having an impact on abnormal losses. Upgraded recommendations do not possess statistically significant results, which questions the effect *MarketCap* has on abnormal returns.

In the long-term (*Regression 9*), *FROMBUYTOSELL* with the interaction term *MCFROMBUYTOSELL* represents the sole strong relationship between *MarketCap* and recommendation change, which means that *MarketCap´*s impact reduces significantly over time with one outlier, the aforementioned relationship.

*Regression 8: MarketsCap's effect on abnormal returns in the short-term*

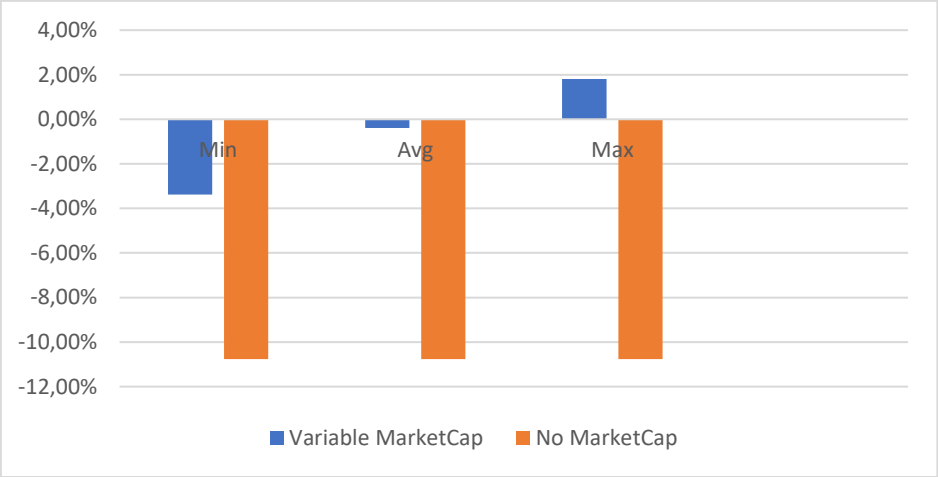
| *Examined variable* | *Coeff.* *%* | *Std.Err* *%* |
|---|---|---|
| NEWBUY | -1,53 | (2,43) |
| NEWHOLD | -4,01 | (2,7) |
| NEWSELL | -8,2** | (3,23) |
| FROMBUYTOHOLD | -6,31*** | (2,39) |
| FROMBUYTOSELL | -10,77*** | (3,53) |
| FROMHOLDTOBUY | 2,04 | (2,41) |
| FROMHOLDTOSELL | -12,42*** | (2,89) |
| FROMSELLTOHOLD | -4,25 | (2,99) |
| FROMSELLTOBUY | 3,82 | (3,05) |
| Marketcap | -0,19 | (0,14) |
| MCNEWBUY | 0,16 | (0,2) |
| MCNEWHOLD | 0,31 | (0,23) |
| MCNEWSELL | 0,61** | (0,27) |
| MCFROMBUYTOHOLD | 0,44** | (0,2) |
| MCFROMBUYTOSELL | 0,89*** | (0,3) |
| MCFROMHOLDTOBUY | -0,08 | (0,2) |
| MCFROMHOLDTOSELL | 0,94*** | (0,24) |
| MCFROMSELLTOHOLD | 0,4 | (0,25) |
| MCFROMSELLTOBUY | -0,31 | (0,26) |
| _cons | 2,36 | (1,64) |
| R-Squared | 0,05 | |
| No.observations | 7490 | |

*Regression 9: MarketsCap's effect on abnormal returns in the long-term*

| *Examined variable* | *Coeff.* *%* | *Std.Err* *%* |
|---|---|---|
| NEWBUY | -2,93 | (7,3) |
| NEWHOLD | -14,14* | (8,21) |
| NEWSELL | -9,22 | (7,14) |
| FROMBUYTOHOLD | -6,85 | (5,51) |
| FROMBUYTOSELL | -17,86** | (7,83) |
| FROMHOLDTOBUY | 11,5* | (6,69) |
| FROMHOLDTOSELL | -4,6 | (6,53) |
| FROMSELLTOHOLD | 2,8 | (8,71) |
| FROMSELLTOBUY | 3,79 | (8,95) |
| Marketcap | -0,46 | (0,34) |
| MCNEWBUY | 0,31 | (0,63) |
| MCNEWHOLD | 1,2* | (0,7) |
| MCNEWSELL | 0,66 | (0,62) |
| MCFROMBUYTOHOLD | 0,49 | (0,47) |
| MCFROMBUYTOSELL | 1,59** | (0,68) |
| MCFROMHOLDTOBUY | -0,9 | (0,57) |
| MCFROMHOLDTOSELL | 0,28 | (0,57) |
| MCFROMSELLTOHOLD | -0,22 | (0,74) |
| MCFROMSELLTOBUY | -0,4 | (0,76) |
| _cons | 5,51 | (3,98) |
| R-Squared | 0,05 | |
| No.observations | 1896 | |

For downgraded recommendations, when considering the dummy variables, there was a negative coefficient, meaning they reflect abnormal losses. By looking at the interaction terms it was possible to tell the total effect when considering *MarketCap*. A positive interaction term indicates that larger *MarketCap* will reduce the abnormal losses. In contrast, a negative interaction term indicates that larger *MarketCap* will lead to greater abnormal losses, which was not the case here. *Column chart 4*, shows the difference *MarketCap* has on the full impact on abnormal returns/losses compared to a company having no *MarketCap*. The orange columns have a *MarketCap* of zero and the blue columns take *MarketCap* into account where Min/ Avg / Max uses the lowest/ average/ highest *MarketCap* of the data observations. It shows the impact on a downgraded recommendation from buy to sell in the short-term period (*Regression 8*).

To understand the full effect of *MarketCap* we implement the *FROMBUYTOSELL* output into *formula 7*. *FROMBUYTOSELL* was the coefficient for $\beta_1$ (-10,77%) and MC*FROMBUYTOSELL* was the coefficient for $\beta_3$ (0,89%) and the mean *MarketCap* for the overall observation was 11,66 which was the constant. The outcome using *formula 7* will give an abnormal loss of –0,42%. This result demonstrates how large *MarketCap* reduces the abnormal loss after the downgraded recommendation and suggests that firms with larger *MarketCap* reflect more accurate stock prices and smaller abnormal price reactions.




*Column chart 4: MarketCap's impact on abnormal returns considering downgraded recommendations FROMBUYTOSELL*

## *Turnover´*s impact on abnormal returns.

*Regressions 15* and *16* take the *Turnover* into account as the associated interaction term. The short-term period (*Regression 15*) does not give strong results, where majority of the outputs are statistically not significant. This suggests that overall, the turnover ratio does not have a substantial impact on the abnormal returns/losses.

The only pair of dummy variable and interaction variable that are significant are *FROMBUYTOSELL* and *TFROMBUYTOSELL*. The smaller the *Turnover* the smaller the impact on abnormal returns in comparison to larger *Turnover*. By looking at *FROMBUYTOSELL* it appears that there will be a positive abnormal return if the *Turnover* was zero, this will not be the case as the firms being investigated are the OMX S30 firms that are highly liquid. Therefore, as the interaction variable was a substantially stronger coefficient although a negative in this case, it indicates that the higher the *Turnover* the more the abnormal loss for this downgrade event.

The reason *Turnover* does not have a large effect on abnormal returns was because all the stocks are highly traded considering they are part of the OMX S30. Smaller firms would be expected to have stronger price reactions regarding *Turnover* on the account of lower trading volumes causing them to be more price sensitive.

In the long-term period no pairings show statistically significant results, which makes it difficult to interpret the regression output.

*Regression 10: Turnover's effect on abnormal returns in the short-term*

| *Examined variable* | *Coeff.* *%* | *Std.Err* *%* |
|---|---|---|
| NEWBUY | 0,22 | (0,28) |
| NEWHOLD | 0,07 | (0,35) |
| NEWSELL | -0,24 | (0,32) |
| FROMBUYTOHOLD | -0,11 | (0,29) |
| FROMBUYTOSELL | 0,77** | (0,34) |
| FROMHOLDTOBUY | 0,99*** | (0,31) |
| FROMHOLDTOSELL | -0,8* | (0,45) |
| FROMSELLTOHOLD | 0,84*** | (0,32) |
| FROMSELLTOBUY | -0,17 | (0,42) |
| Turnover | 0,44 | (0,49) |
| TNEWBUY | 0,34 | (0,67) |
| TNEWHOLD | -1 | (0,8) |
| TNEWSELL | -1,6** | (0,71) |

*Regression 11: Turnover's effect on abnormal returns in the long-term*

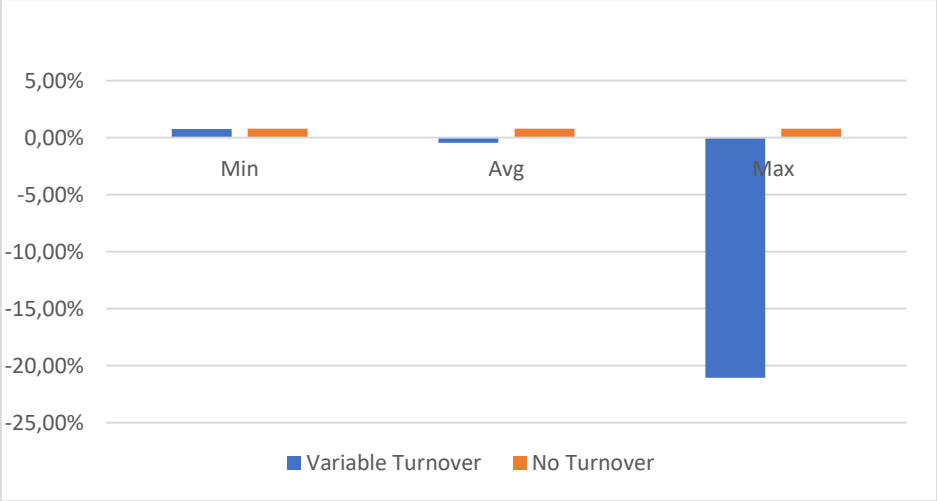
| *Examined variable* | *Coeff.* *%* | *Std.Err* *%* |
|---|---|---|
| NEWBUY | 1,17* | (0,62) |
| NEWHOLD | 0,13 | (0,81) |
| NEWSELL | -1,01 | (0,94) |
| FROMBUYTOHOLD | 0,04 | (0,53) |
| FROMBUYTOSELL | 1,37 | (0,87) |
| FROMHOLDTOBUY | 1,38* | (0,74) |
| FROMHOLDTOSELL | -1,01 | (0,67) |
| FROMSELLTOHOLD | 0,81 | (0,65) |
| FROMSELLTOBUY | -0,36 | (0,9) |
| Turnover | 1,72* | (0,98) |
| TNEWBUY | -1,46 | (1,41) |
| TNEWHOLD | -1,45 | (1,65) |
| TNEWSELL | -1,67 | (2,01) |

| | | |
|---|---|---|
| TFROMBUYTOHOLD | -2,06*** | (0,68) |
| TFROMBUYTOSELL | -2,44*** | (0,71) |
| TFROMHOLDTOBUY | 0,09 | (0,7) |
| TFROMHOLDTOSELL | -1,3 | (0,99) |
| TFROMSELLTOHOLD | -0,85 | (0,7) |
| TFROMSELLTOBUY | 0,72 | (0,92) |
| _cons | -0,07 | (0,19) |
| R-Squared | 0,06 | |
| No.observations | 7490 | |

| | | |
|---|---|---|
| TFROMBUYTOHOLD | -3,15*** | (1,21) |
| TFROMBUYTOSELL | -2,5 | (1,62) |
| TFROMHOLDTOBUY | -1,08 | (1,73) |
| TFROMHOLDTOSELL | -1,12 | (1,35) |
| TFROMSELLTOHOLD | -1,5 | (1,42) |
| TFROMSELLTOBUY | -1,35 | (1,91) |
| _cons | -0,45 | (0,39) |
| R-Squared | 0,04 | |
| No.observations | 1896 | |

To visualize the effect of *Turnover* on abnormal returns *Column chart 5* based on our data set illustrates how different turnover ratios impact abnormal returns. The average turnover ratio was taken into consideration because as can be seen in the column chart the max turnover ratio has an extreme impact on the abnormal return. This extreme impact can be due to other news or events being the reason for it.

To understand the full effect of *Turnover* same method was used only *formula 8* was implemented. *FROMBUYTOSELL* is the coefficient for $\beta_1$ (0,77) and *TFROMBUYTOSELL* is the coefficient for $\beta_3$ (-244%) and the mean turnover ratio for the overall observation was 0,005 which is the constant. The outcome using *formula 8* will give an abnormal loss of –0,46%. This result indicates that firms with small *Turnovers* have little to no effect on abnormal price reaction after this downgraded recommendation, whereas firms with large *Turnovers* shows tremendous abnormal losses. This suggests that investors are risk averse and react quickly when a sell recommendation is published.




*Column chart 5: Turnover's impact on abnormal returns considering downgraded recommendations FROMBUYTOSELL*

### *MarketCap's* and *Turnover´s* impact when narrowing the groupings and their evolution

To keep the structure of the subheading consistent, coherent regressions were performed. The regressions that are absent are *MarketCap's* and *Turnover's* impact on a narrower set of dummy variables and how *MarketCap* and *Turnover*'s effects have changed over time. However, as a portion of the regressions showed small evidence of statistical significance they are not discussed further, as this made it hard to interpret their true effects. When running these regressions both the dummy variables and interaction variables were scaled from ten directions of recommendations to 3 standings of recommendations. This questions the reliability of the event study narrowing the change in recommendations to a recommendations standing. This is due to several of the observations interfering with each other, such as a hold recommendation can move in different directions. The results of the absent regressions can be found in the appendix.

# 6. Conclusion

These concluding remarks will present a summary of the findings, provide an answer to the main research question, discuss the implications of the findings and its limitations as well as suggestions for further studies.

Overall, the stock recommendations are shown to have an impact on the stock prices both in the short-term period and in the long-term period. Upgraded recommendations to a buy show significant cumulative abnormal returns when considering only the impact of stock recommendations. Downgraded recommendations to a sell displayed more statistically significant results and showed more substantial cumulative abnormal losses compared to the upgraded recommendations. In addition to sell recommendations having stronger impact on stock prices, they also show less price reversal in the long-term period. This suggests that sell recommendations carry more economically valuable information that was reflected in the stock price. Throughout the whole time period (2006-2021) stock recommendations have gradually had lesser impact on stock prices and therefore smaller abnormal returns for their followers. By comparing the impact between the three time intervals in *Regressions 5* to *7*, the CAR in the short-term period has decreased around 25%. This shows signs of the stock market moving more towards the strong form of the efficient market hypothesis.

When considering the interaction variable *MarketCap* it showed strong evidence of having impact on downgraded recommendations. The downgraded recommendations showed significant abnormal losses when not considering *MarketCap*, yet when the abnormal losses were adjusted to the size of the firm, it shows that larger *MarketCap* reduces the abnormal losses in the short-term. In the long-term period the results displayed statistically insignificant outputs. This result favors the EMH in a sense that larger companies should have more accurate stock prices, with more analysts following them, which reflects their prices more accurately.

The results when implementing *Turnover* as interaction variable showed that in a few significant outputs it has impact on the downgraded recommendations *FROMBUYTOSELL* in the short-term. The value of the *Turnover* interaction variable was substantially larger than the dummy variable. This indicates that the higher the *Turnover* the more the abnormal loss for this downgrade event. This result compliments the price pressure hypothesis to the extent that price reactions to a stock that is highly liquid is pressured down due to a downgraded

recommendation. This also contradicts the EMH as abnormal price reaction occurs due to the published recommendation.

Our findings suggest that stock analysts do make a valuable contribution to price discovery. The results regarding both buy and sell recommendations side more with the information hypothesis as to the price pressure hypothesis. There are clear signs of market reaction around publication of stock recommendations which suggest that their fundamental analysis does contain valuable information that are reflected in stock prices within the Swedish stock market. There is a strong sign of the financial market reacting the same day as publications are made as the short-term period show abnormal returns and stay fairly stable towards the long-term period. The data sample showed a clear bias of stock analysts favoring buy recommendations over sell recommendations as previous literature has proven. With buy recommendations having over twice more observations compared to sell. However, previous literature has presented evidence of a much stronger bias towards buy recommendations than observed in this study, which could suggest that stock analysts are becoming less reluctant to publish sell recommendations. One could argue that the stronger impact of sell recommendations may be connected to the fact that analysts are more reluctant to issue them and thus to the investor they may appear more significant.

The study suffers from certain limitations which will now be presented as suggestions for future studies. Due to the enriched dataset the presence of the high event frequency has been challenging. To eliminate the effect of previous recommendations, in combination with keeping a large data set the estimation window was overlooked. By doing so the adjusted market model allowed an independent data set with less noise. In hindsight however, further research should be conducted to either reduce the number of analysts covered or allow an overlap between the observations. Furthermore, it could be of interest to analyze whether different analysts have different impact on their effects, whereas this thesis solely investigates the generic analysts' recommendations without considering their track record, employer, number of companies they follow, etc. Another limitation was that the study has exclusively looked at the direction of the recommendation and not examined the context of these. Future studies could also consider investigating if stock recommendations coincide with earnings announcements and the following response of the analysts. Likewise, whether analysts maintain a level of independence or simply follow their peers. Lastly, the data used consisted of OMX S30 companies as of 2021 and did not account for previous members of the index.

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# Appendix

*Regression 12: Whether market cap effect the magnitude of the breakdown in the short-term.*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 11,79*** | (1,96) |
| HOLD | 5,54*** | (2) |
| Marketcap | 0,63*** | (0,13) |
| MCBUY | -0,86*** | (0,16) |
| MCHOLD | -0,43** | (0,17) |
| _cons | -8,28*** | (1,58) |
| R-Squared | 0,04 | |
| No.observations | 6109 | |

*Regression 13: Whether market cap effect the magnitude of the breakdown in the long-term.*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 13,8*** | (5,08) |
| HOLD | 3,2 | (4,91) |
| Marketcap | 0,23 | (0,31) |
| MCBUY | -1,06** | (0,44) |
| MCHOLD | -0,24 | (0,42) |
| _cons | -3,43 | (3,56) |
| R-Squared | 0,03 | |
| No.observations | 1531 | |

*Regression 14: Whether market cap effect the impact on abnormal returns over the period 2006-2010*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 14,72*** | (3,34) |
| HOLD | 7,75** | (3,48) |
| Marketcap | 0,87*** | (0,23) |
| MCBUY | -1,11*** | (0,28) |
| MCHOLD | -0,63** | (0,3) |
| _cons | -11,03*** | (2,65) |
| R-Squared | 0,05 | |
| No.observations | 1797 | |

*Regression 15: Whether market cap effect the impact on abnormal returns over the period 2011-2015*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 8,52*** | (3,06) |
| HOLD | 3,03 | (3,14) |
| Marketcap | 0,43** | (0,21) |
| MCBUY | -0,57** | (0,26) |
| MCHOLD | -0,2 | (0,26) |
| _cons | -6,09** | (2,48) |
| R-Squared | 0,05 | |
| No.observations | 1845 | |

*Regression 16: Whether market cap effect the impact on abnormal returns over the period 2016-2021*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 10,3** | (4,07) |
| HOLD | 3,12 | (4,07) |
| Marketcap | 0,42 | (0,27) |
| MCBUY | -0,73** | (0,34) |
| MCHOLD | -0,23 | (0,34) |
| _cons | -5,73* | (3,19) |
| R-Squared | 0,03 | |
| No.observations | 1923 | |

*Regression 17: Whether turnover effect the magnitude of the breakdown in the short-term.*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 0,74*** | (0,28) |
| HOLD | 0,36 | (0,26) |
| Turnover | -1,36*** | (0,45) |
| TBUY | 2,1*** | (0,58) |
| THOLD | 0,39 | (0,55) |
| _cons | -0,27 | (0,22) |
| R-Squared | 0,05 | |
| No.observations | 6109 | |

*Regression 18: Whether turnover effect the magnitude of the breakdown in the long-term.*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 1,41** | (0,58) |
| HOLD | 0,55 | (0,52) |
| Turnover | -0,01 | (0,71) |
| TBUY | 0,47 | (1,21) |
| THOLD | -0,29 | (1) |
| _cons | -0,85** | (0,4) |
| R-Squared | 0,05 | |
| No.observations | 1531 | |

*Regression 19: Whether turnover effect the impact on abnormal returns over the period 2006-2010*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 1,04* | (0,57) |
| HOLD | 0,17 | (0,55) |
| Turnover | -0,92 | (0,68) |
| TBUY | 1,4 | (0,86) |
| THOLD | 0,54 | (0,78) |
| _cons | -0,38 | (0,47) |
| R-Squared | 0,05 | |
| No.observations | 1797 | |

*Regressions 20: Whether turnover effect the impact on abnormal returns over the period 2011-2015*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 0,43 | (0,35) |
| HOLD | 0,56 | (0,44) |
| Turnover | -2,71*** | (0,72) |
| TBUY | 3,41*** | (0,93) |
| THOLD | 0,43 | (1,13) |
| _cons | 0,08 | (0,26) |
| R-Squared | 0,09 | |
| No.observations | 1845 | |

*Regression 21: Whether turnover effect the impact on abnormal returns over the period 2016-2021*

| *Examined variable* | *Coeff. %* | *Std.Err %* |
|---|---|---|
| BUY | 0,07 | (0,51) |
| HOLD | 0,49 | (0,54) |
| Turnover | -2,17* | (1,15) |
| TBUY | 3,86*** | (1,48) |
| THOLD | -0,16 | (1,64) |
| _cons | 0,05 | (0,39) |
| R-Squared | 0,05 | |
| No.observations | 1923 | |

*Table 3: Instruments in OMX30 and the Benchmark OMXSPI*

| **Instrument in OMX30** | **Nr. Recommendations** |
|---|---|
| ABB Ltd | 366 |
| Alfa Laval | 255 |
| Autoliv SDB | 120 |
| ASSA ABLOY B | 278 |
| Atlas Copco A | 319 |
| Atlas Copco B | 15 |
| AstraZeneca | 282 |
| Boliden | -296 |
| Electrolux B | 698 |
| Ericsson B | 373 |
| Essity B | 46 |
| Evolution | 31 |
| Getinge B | 216 |
| Hexagon B | 171 |
| Hennes & Mauritz B | 354 |
| Investor B | 91 |
| Kinnevik B | 170 |
| Nordea Bank Abp | 350 |
| Sandvik | 355 |
| SCA B | 217 |
| SEB A | 318 |
| Securitas B | 450 |
| Sv. Handelsbanken A | 30 |
| Skanska B | 185 |
| SKF B | 303 |
| Swedbank A | 341 |
| Swedish Match | 220 |
| Tele2 B | 323 |
| Telia Company | 349 |

| | |
|---|---|
| Volvo B | 580 |
| **Benchmark** | |
| OMXSPI | |

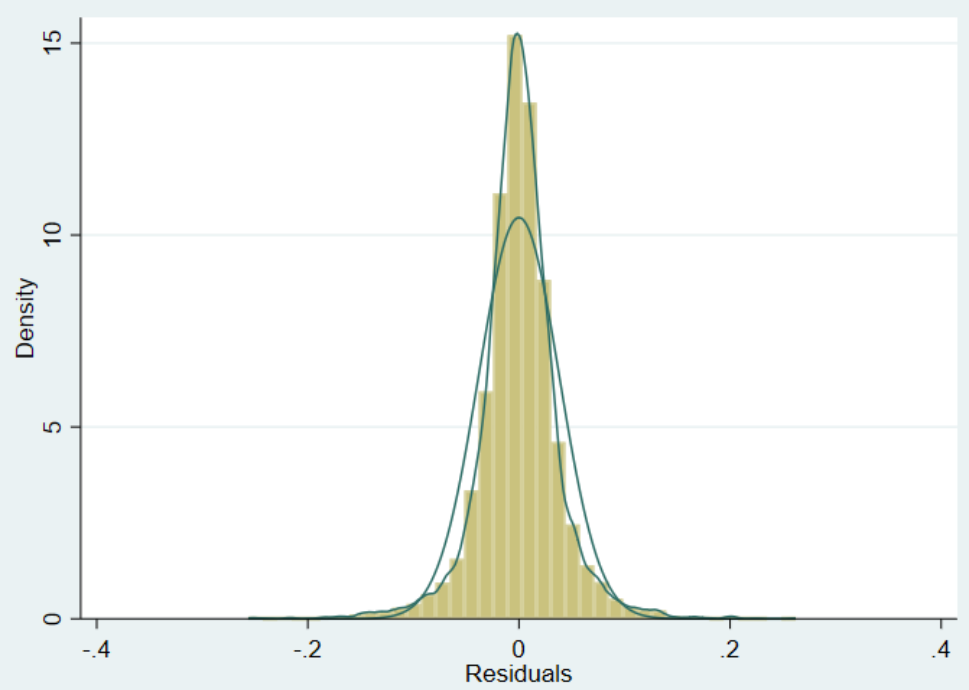


*Figure 1: Result of normality test*