INVESTOR SENTIMENT IN THE NORDIC STOCK MARKETS

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ABSTRACT

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Abstract

This study examines the effect of sentiment in the Nordic stock markets: Finland, Denmark, Sweden, Norway and Iceland. In this context, the role of United States' sentiment is also examined. The notion behind this is to observe the effect of a potential sentiment *spillover.* In addition, the study examines whether US and/ or regional -sentiment indices impact local country- level sentiment indices and regional indices. Finally, it is tested whether local and/ or regional returns affect sentiment.

Results show a relation between sentiment and stock returns regarding all the Nordic countries and provide evidence for the spillover notion as well. The effects are, however, not equal for all countries. Countries show varying levels of sensitivity to different sentiment indices.

The impact of external sentiment with regards to local sentiment is observed to prevail as well. For example, in the case of Norway, US country sentiment is seen to positively affect Norwegian country sentiment; high country sentiment in the US is seen predictive of relatively higher local sentiment in Norway in the following month.

As to the return- sentiment relationship, previous month OMX- Helsinki returns are seen to strongly influence following period sentiment; higher stock returns in the previous month pave way for relatively higher sentiment in the following month. In addition, Danish and Norwegian -market sentiment, as well as Eurozone sentiment, both country and market, show sensitivity to previous month Nordic returns.

Keywords
Investor sentiment, US sentiment, Eurozone sentiment, Stock returns, Nordic countries

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TIIVISTELMÄ

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Tiivistelmä

Tämä tutkimus tarkastelee sentimentin vaikutusta pohjoismaisilla osakemarkkinnoilla: Suomi, Tanska, Ruotsi, Norja ja Islanti. Tässä yhteydessä tarkastellaan myös Yhdysvaltojen sentimentin asemaa. Ajatus tämän taustalla on havaita mahdollisen sentimentin ”heijastumisen” vaikutus. Lisäksi tutkimuksessa selvitetään, vaikuttavatko Yhdysvaltain ja/ tai alueelliset -sentimentti indeksit paikallisiin maakohtaisiin ja alueellisiin indekseihin. Lopuksi tarkastellaan myös, vaikuttavatko paikalliset ja/ tai alueelliset (osake) tuotot sentimenttiin.

Tulokset näyttävät suhteen sentimentin ja osaketuottojen välillä koskien kaikkia pohjoismaita. Lisäksi käsite sentimentin heijastumisesta saa myös tukea. Vaikutukset eivät kuitenkaan ole yhtenäisiä koskien kaikkia maita sillä maat osoittavat vaihtelevaa herkkyyttä eri sentimentti indeksejä kohtaan.

Tutkimuksessa myös todetaan ulkopuolisen sentimentin vaikutus paikalliseen sentimenttiin. Esimerkiksi Norjan tilanteessa on nähtävissä Yhdysvaltain maakohtaisen sentimentin positiivinen vaikutus Norjan maakohtaiseen sentimenttiin; Yhdysvaltain korkean maakohtaisen sentimentin voidaan nähdä ennakoivan suhteellisesti korkeampaa maakohtaista sentimenttiä Norjassa seuraavana kuukautena.

Koskien tuotto- sentimentti suhdetta, tuloksissa korostuu etenkin OMX- Helsinki tuottojen vahva vaikutus seuraavan kuukauden sentimenttiin; edelliskuukauden korkeammat osaketuotot pohjustavat suhteellisesti korkeampaa sentimenttiä Suomessa seuraavana kuukautena. Lisäksi Tanskan ja Norjan -markkina sentimentti, sekä myös euroalueen sentimentti, sekä alueellinen, että markkinakohtainen, osoittavat altistusta edelliskuukauden OMX- Nordic tuottoihin.

Asiasanat
Sijoittajien sentimentti, Yhdysvaltojen sentimentti, Euroalueen sentimentti, Osakemarkkinat, Pohjoismaat

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1 INTRODUCTION

Investor sentiment. In studying investor behavior, the role of sentiment may be widely contested. What role, if any, does sentiment play in the financial markets? Does sentiment influence investors' decision- making? Does investor sentiment affect securities prices? If yes, to which extent? In which ways investor sentiment, in particular, affects the stock market? Traditional economic theory would provide strict abstinence against such notions, but research has come to present alternatives.

This study takes a wide perspective on sentiment and examines its effect on the Nordic stock markets; Finland, Denmark, Sweden, Norway and Iceland. In addition, the Nordic market is examined as whole by using a joint all share index with the Finnish, Danish and Swedish stocks. In broad terms, the objective is to provide answers to three questions: 1) Does sentiment affect Nordic stock returns? In this context sentiment is approached from three different angles: Local, regional and United States. As such, the first question may be specified to answer whether local, regional (for which Eurozone sentiment is used) and US -sentiment affects Nordic stock returns. The notion behind including measures of US sentiment in the study is to observe the effect of a potential investor sentiment *spillover.* This, to find whether prevailing sentiment levels in the United States, the world's largest economy affect stock market returns in other countries, in this case, the Nordic countries. Or, are the Nordic markets exempt from any spillover effect?

Progressing to question 2), Does US and/ or regional -sentiment affect local sentiment in the Nordic countries, and regional sentiment? Here, the constituents of local and regional -sentiment are studied with regards to US and regional sentiment. Based on previous literature, this approach seems less studied and as so the objective is to examine whether US and/ or regional sentiment affects local country- specific sentiment and whether US sentiment affects sentiment in the Eurozone. Here again, a potential sentiment spillover effect may be observed. Finally, the study briefly takes a counter- perspective on the sentiment- return relationship and examines whether returns affect sentiment. The objective is to answer the question 3) Do local and regional -returns in the Nordic countries affect local and regional -sentiment?

The analysis is performed with local country- specific sentiment indices as well as regional sentiment indices. The local and regional indices used are country level sentiment indices and country market sentiment indices. In addition, for the US, Baker and Wurgler's (2006) sentiment index is used.

Following, the study hypotheses (3) are outlined:

1) Investor sentiment affects aggregate Nordic stock returns. Further, in predictive terms, the relation is negative.

The main hypothesis of the study is built on the behavioral approach that sentiment does indeed affect stock returns. This notion is backed by several studies (e.g. Baker and Wurgler, 2006 & 2007; Brown and Cliff, 2005; Corredor, Ferrer and Santamaria, 2013). Further, earlier evidence (e.g. Brown and Cliff, 2005; Schmeling, 2009) shows that the sentiment- return relation is negative; high levels of sentiment are followed by lower returns and vice versa. This and whether any of the effect comes from US sentiment will be validated through analysis.

Previous studies (Baker, Wurgler, & Yuan, 2012; Corredor et al., 2013) have ventured the notion of sentiment having cross- border effects. The latter of the cited studies, found Baker and Wurgler's (2006) sentiment index to show high explanatory power despite the countries in the study being European. If US sentiment does possess such influence on foreign stock returns, this would argue in its favor to influence other countries' sentiment as well. Building on this notion, the second hypothesis of this study is arrived at:

2) Local sentiment shares a positive relation with external sentiment.

By external sentiment it is meant non- local sentiment, in this study, US and regional sentiment.

Finally, the study tests the return- sentiment relation which gains support from previous literature (e.g. Brown & Cliff, 2004; Otoo, 1999) leading to the final hypothesis:

3) Stock returns affect sentiment; past and contemporaneous -stock returns are positively related to sentiment.

The paper is structured as follows. First, a review of previous literature is conducted beginning by defining investor sentiment itself. In this section, various measures of sentiment are discussed in addition to a broad look into other investor sentiment linked studies and their results. The literature review section also looks into the counter- perspective of the stock market -sentiment relation and discusses whether stock prices affect sentiment. The literature review is followed by the data and methods -section, which will entail description of the data and empirical methods used for analysis regarding this study. In the empirical results and discussion section, research results will be discussed and finally, conclusions will be made.

2 LITERATURE REVIEW

Eugene Fama's theory of efficient markets, the efficient market hypothesis (EMH) first introduced in the 1960's has played a key role in economic research and literature. The basic notion being that markets are efficient and stock prices reflect all available information, both public and private (strong form). Fama (1965) further elaborates that stock prices follow a random walk, and any changes are independent from previous changes. An implication of the efficient market hypothesis would thus be that it is impossible to beat the market and the only way to gain excess returns is by undertaking more risk. However, markets do not always exert such rational behavior as proposed by Fama's hypothesis, and the underlying reasons for such behavior has been sought to be studied within the field of behavioral finance. Behavioral finance aims to study and explain economic anomalies unexplainable by traditional economic theory (such as the EMH) from a behavioral perspective instead. This is done by studying investor behavior and irrationality and the way such behavior affects markets.

There has been extensive research on investor sentiment and its role in the financial markets. If markets are efficient, but indeed influenced by sentiment, which would for example cause mispricing in the stock market, would not any profit opportunities resulting from such mispricing be eliminated by rational traders, and thus render the mispricing short- lived? However, evidence in many cases suggests the effects of sentiment to be more significant as will be discussed in this study.

2.1 Defining investor sentiment

Investor sentiment itself can be defined in different ways, while Baker and Wurgler (2006) define investor sentiment as a *"propensity to speculate"* (p. 5). This definition would imply investors' varying tendencies to speculate at different levels of sentiment. Tetlock (2007) takes a more traditional approach in referring to investor sentiment as *"..the level of noise traders' beliefs relative to Bayesian beliefs"* (p. 1142). This can be thought of as any beliefs formulating a gap with respect to Bayesian beliefs, in other words the beliefs of rational arbitrageurs, are regarded a product of investor sentiment.

A more blunt way of defining investor sentiment would be to generally regard sentiment as simply portraying prevailing optimism or pessimism in the market. If investors are perceived to be in an optimistic state, this could for example help explain higher valuations of certain stocks as investors hold higher and positive expectations regarding future returns of those stocks. Conversely, in a pessimistic state, investors' future expectations would be lower and more constrained.

2.2 Measuring sentiment

Investor sentiment can be measured using a wide range of different methods. Measures of sentiment may be direct, as in through surveys, or indirect, where different proxies for sentiment are used for measuring the level and type of sentiment. These proxies can be based on different types of information and data. Individual sentiment proxies can be reconciled to form sentiment indexes. Examples of such indexes include several online indexes such as Cable News Network's (CNN) Fear and Greed index (Cable News Network, 2018). Baker and Wurgler's (2006) sentiment index which is used in this study is widely referred to in many sentiment studies and will be later discussed more precisely.

Brown and Cliff (2004) study investor sentiment and the near- term stock market and categorize indirect measures of sentiment into four groups (Market performance measures, measures based on types of trading activity, derivatives trading activity measures and lastly, other- sentiment proxies) to better examine their relationship with sentiment. Many of the variables are found significantly related to direct measures of sentiment arguing in strong favor towards their use as sentiment proxies.

When discussing market performance-based measures of sentiment, indicators such as the number of new highs to new lows may be observed. The number of new highs to new lows examines the number of stocks hitting new highs as compared to the number of stocks hitting new lows over a specified period of time (for instance last 52- weeks). When the number of new highs exceed the number of new lows, the market signals strength. The HI/LO is thus seen to capture the relative strength of the market. Different trading activity measures of sentiment include for example the percentage change in margin borrowing (Brown & Cliff, 2004). This indicates the tendency level of investors to borrow funds in order to invest. A high percentage increase would indicate optimistic expectations regarding the future as investors are willing to stake borrowed funds to exploit higher expected future returns.

Different derivatives variables which relate to derivatives trading activity have been used as sentiment indicators as well. One such measure is the put- call ratio. Several studies (Bandopadhyaya & Jones, 2008; Pan & Poteshman, 2006; Simon & Wiggins, 2001) confirm the use of the put- call ratio (PCR) as being a good measure of market sentiment. The notion behind this is that a higher PCR signals bearish sentiment in the market, while a lower ratio would suggest a bullish market. If investors are buying more put options as compared to call options, investors are expecting the market to go down. Conversely, if the volume of call options is greater than that of put options, markets are expected to rise, as based on the PCR.

Other proxies for sentiment include for example the closed- end fund discount. C. M. C. Lee, Shleifer and Thaler (1991) study and confirm discounts on closed- end funds to proxy changes in individual investor sentiment. Discounts on such funds are high, deemed due to the pessimistic viewpoint of investors regarding future returns. Reversely, when investors are feeling optimistic about future returns, the discounts on closed- end funds are low. Other studies such as Neal and Wheatley (1998) study and provide evidence of return predictability through different measures of investor sentiment, using the closed- end fund discount as one of the individual investor sentiment proxies. However, some studies (e.g. Chen, Kan, & Miller, 1993; Qiu & Welch, 2004) have openly disputed the role of the closed- end fund discount as a valid proxy for sentiment and changes in sentiment.

Investor sentiment measures based on consumer confidence have also been used in a number of studies. Qiu and Welch (2004) validate consumer confidence as a proxy for investor sentiment. Maik Schmeling (2009) also uses consumer confidence as a proxy for individual investor sentiment and studies whether sentiment affects expected stock returns. The study spans across 18 industrialized countries including the US, UK and Japan. Schmeling (2009) further advocates using consumer confidence as a proxy for investor sentiment, especially for an international analysis, due to factors such as the wide availability of consumer confidence data which spans across sufficient time periods. In addition, the fact that it acts as a relatively well comparable proxy across countries further supports its use.

Other measures of sentiment, related to more exogenous variables, include for example weather (Hirshleifer & Shumway, 2003; Kaustia & Rantapuska, 2013), sports (Edmans, Garcia, & Norli, 2007) and media (Tetlock, 2007). For example, Kaustia and Rantapuska (2013) study the effect of mood (sentiment) on trading behavior in Finland using hours of daylight and local weather as main variables to measure mood. The results of the study however show the effects of the mood variables to be in most cases statistically insignificant on trading behavior, despite in some cases producing anticipated signs. Other studies (Bollen, Mao, & Zeng, 2011; Siganos, Vagenas- Nanos, & Verwijmeren, 2017) use social media data, namely through tweets from Twitter and status updates from Facebook, to examine public mood and its relationship with the stock market. They use tools to filter and process the content of relevant Twitter tweets and Facebook status updates. For example, Bollen et al. (2011) account only Twitter tweets which clearly depict the state of mood of the writer of the tweet. Such tweets exclusively considered include expressions entailing words, such as feel, and don't feel, which directly portray the state of mood the writer is in.

2.3 Results from other studies

Baker and Wurgler (2006) find investor sentiment to have considerable cross- sectional effects. The cross- section of future stock returns were found to be dependent on beginning- of- period measures of sentiment. High estimated sentiment is followed by subsequently low relative returns on stocks such as small stocks, young stocks and high- volatility stocks. Conversely, if sentiment is perceived low, subsequent returns on such stocks are relatively high. Chung, Hung and Yeh (2012) also study investor sentiment in the cross- section of stock returns. The focus of the study was on the disproportionateness of the predictability of investor sentiment regarding the cross- section of stock returns, as per economic expansion and recession states. Results show predictive power of sentiment to be well indicative for the returns of portfolios formed on various criterion such as size, dividend yield and return volatility. However, this was true only in expansion states of the economy.

Baker and Wurgler (2006) present two paths through which sentiment is predicted to have cross- sectional effects. While mispricing is acknowledged to be the result of both demand shocks and arbitrage constraints, the first channel of cross- sectional effect of sentiment derives from the variability of sentiment-fueled demand across stocks. Through this channel, different stocks are prone to varying levels of sentiment- driven demand. Corredor et al. (2013) follow on parallel terms and state sentimental demand shocks to vary across different stocks while limits to arbitrage are considered constant. This raises the relative demand for certain types of stocks, in particular those which are harder to valuate and thus justifiable for a wider range of valuations as bestowed by prevailing levels of sentiment.

The second path of cross- sectional effect of sentiment as discussed in Baker & Wurgler (2006) and Corredor et al. (2013) is through the variability of arbitrage constraints across stocks. This path accounts for the extent of difficulty of arbitrage across different stocks, through which the elimination of mis- pricing, is seen possible and viable for rational investors. As a result, even if the effect of changes in sentiment be seen even across stocks, as opposed to affecting only the speculative kind; those harder to valuate, there are differences as to the capacity for arbitrage between different stocks. Arbitrageurs are likely to be of risk averse nature with short horizons (De Long, Shleifer, Summers, & Waldmann, 1990) which is likely to limit their eagerness to act towards exploiting the mis- pricing through which enabling the push of prices back towards fundamentals. Stocks such as small stocks, high volatility stocks, young (new) stocks, unprofitable stocks, distressed stocks, non- dividend paying stocks and extreme- growth stocks are seen to be more prone to both sentiment- fueled demand as well as higher arbitrage constraints (Baker & Wurgler, 2006). Indeed, investor sentiment is seen to considerably affect the future returns of stocks that are harder to value and arbitrage (Corredor et al., 2013).

The results obtained by Corredor et al. (2013) differed across the several countries studied in their paper and were seen to be influenced by the sentiment proxy used, emphasizing the role of the choice of sentiment index and its construction. In addition, stock characteristics were seen to be highly important in explaining the sentiment effect. Other factors such as cultural and institutional differences are seen to have influence towards the observed cross- country differences in sentiment effects as well. Schmeling (2009) argues the effect of sentiment on stock returns to be greater for countries culturally more inclined to herd-like behavior and overreaction, because if which stock markets in more collectivist countries are seen more prone to the effects of investor sentiment as compared to stock markets of more individualistic countries. In addition, countries with less market integrity were seen to fair similarly. The role of market integration reducing sentiment related effects is also brought up by Siganos et al. (2017) who finds a positive relation between divergence of sentiment and stock price volatility for both local and global divergence of sentiment. However, in the case where markets are more integrated, the local effect of such divergence proves much weaker.

> *"..waves of sentiment have clearly discernible, important, and regular effects on individual firms and on the stock market as a whole."*
> (Baker & Wurgler, 2007, p. 149)

In their 2007 study *"Investor sentiment in the stock market"* Baker and Wurgler further investigate the role of investor sentiment in the stock market. It is again highlighted that stocks more difficult to value and arbitrage are most affected by sentiment. In addition, Baker and Wurgler (2007) illustrate the theoretical effects of sentiment on different types of stocks through a "*sentiment seesaw.*" The interpretation is that in high sentiment periods, speculative stocks; stocks difficult to value and arbitrage have greater relative valuations, while safer, easy to arbitrage stocks are undervalued (relative to fundamental value), but to a lesser extent. Conversely, in periods of low sentiment, speculative stocks, stocks difficult to value and arbitrage have lower relative valuations, while safer, easy to arbitrage stocks are slightly overvalued. Indeed, De Long et al. (1990) state noise trading to have the potential to lead to large deviations between market prices with respect to fundamental values.

W. Y. Lee, Jiang and Indro (2002) discuss investor sentiment as a priced systematic risk. As prices deviate from fundamentals, and arbitrageurs are limited in their response, prices are left affected by sentiment. The unpredictability of noise traders' opinions limits arbitrage in a sense that such opinions can become further distorted and increase the risk associated with arbitrage (De Long et al., 1990). For instance, imagining a period of high- sentiment, where in terms of optimism or pessimism, a large number of sentiment- fueled investors are feeling highly optimistic as to the future returns on stocks. This feeling can be considered to spread out equally on all stocks or only on specific types of stocks. Stocks are thus optimistically valued, deviating from fundamental values. This begins to translate into prices after trading takes place under such perceptions.

Meanwhile, on the other side of the spectrum, rational traders, arbitrageurs, notice the over- pricing with respect to fundamentals and aim to exploit the opportunity. As De Long et al. (1990) state, the behavior of professional arbitrageurs may be largely inclined as a response towards noise trading rather than solely focusing on trading on fundamentals. As a result, in this scenario, in the absence of constraints, arbitrage is largely successful and mis- pricing is eliminated. However, stocks which are harder to fundamentally value i.e. young stocks, growth-stocks among others also prove to be the ones harder to arbitrage (Baker & Wurgler, 2006). Even if a stock be perceived clearly over- valued, the extent to which it might further continue to raise in value may be impossible to approximate. In addition, there is the risk that noise traders' beliefs fail to revert back to the mean for a prolonged period, and instead become more solid (De Long et al., 1990). Stambaugh, Yu and Yuan (2011), argue short- selling impediments to act as leading causes in making mispricing more challenging to be corrected. Considering such factors and constraints make arbitrage extremely costly and risky and as a result pose limits to arbitrage. As arbitrage would fail to fully correct mispricing, this would possibly leave prices affected by investor sentiment even in equilibrium (W. Y. Lee et al., 2002). This way the price of the stock can be seen to bear the effect of investor sentiment even in the longer run.

Viewing sentiment as a priced risk gains additional support from other earlier literature as well. C. M. C. Lee et al. (1991) discuss the fact that sentiment is widespread enough to affect the pricing of small stocks relative to their fundamentals (in addition to affecting the pricing of closed- end funds studied in their paper) due to the inherent added risk component (of sentiment). Sentiment is thus considered a non- fundamental, priced risk present in the market, implicating that changes in stock returns may partly be seen to stem from changes in investor sentiment. However, interestingly, noise traders, despite themselves acting as price distorters, have the potential to earn higher returns than rational investors due to undertaking the increased risk, created by their own actions (De Long et al., 1990).

A large body of literature (incl. C. M. C. Lee et al., 1991; Neal & Wheatley, 1998) suggests sentiment to be solely a noise trader trait, encompassed within noise trader risk, concerning mainly individual investors. However, sentiment does not appear to be limited as the burden of solely individual investors. For example, Schmeling (2006), using a data set based on weekly surveys, studies institutional and individual investor sentiment and its role in relation to stock returns. Individual sentiment is seen to represent noise trader risk while institutions are seen to be smart money i.e. informed investors. Results show sentiment to play a role in several stock markets around the world over horizons up to one year. Further, institutional investor sentiment is seen to forecast returns, on average, correctly, while individual sentiment negatively predicts market movements.

Further, Fisher and Statman (2000) discuss the fact that investors are not all alike, which would translate into differing sentiments as well. They studied three groups of investors, Wall Street strategists, writers of investment newsletters and individual investors. They found the relationship between sentiments of individual investors and Wall Street strategists and future S&P 500 returns to be negative and statistically significant. Changes in sentiment levels of Wall Street strategists were said to be uncorrelated to the changes in sentiment of the latter two groups. The way individual investors and newsletter writers were seen to form their sentiments, were seen to be based on the continuation of short- term returns. Brown and Cliff (2004) concur to the notion that past market returns may be regarded as valid drivers of sentiment. Verma and Soydemir (2009) elaborate on sentiment differences as rational and irrational sentiment, as opposed to fully irrational. They find irrational sentiment, in the form of too much optimism, leads to downward revisions in the market price of risk, while rational sentiment fails to have any significant effects. Schmeling (2006) finds that in forming their expectations institutional investors account for expected sentiment of individual investors and as individual investors are expected to become more optimistic, institutional investors become more pessimistic and lower their return forecasts. This links to the notion that irrational traders and rational traders hold opposite beliefs, outlined by Verma and Soydemir (2009) as well.

W. Y. Lee et al. (2002) found sentiment to be a strong factor towards explaining excess returns and conditional volatility, affecting both small and large capitalization stocks. This, arguing against the common notion of sentiment being solely an individual investor trait impacting mainly small capitalization stocks. Fisher and Statman (2000) further argue against the notion that individual investors' sentiment is primarily affected by the returns on small stocks, and conversely that large investors' sentiment is mainly affected by the returns of large-cap stocks. Results from their study of investor sentiment and stock returns support this idea as they find the correlation of changes in the sentiment of individual investors with large- cap stock returns higher than that with small- cap stocks. For large investors, small- cap stock returns were found more correlated with the changes in their sentiment (as opposed to returns on large- cap stocks). However, despite acknowledging sentiment to affect large investors, Brown and Cliff (2004) in their study find the strongest relations between their measures on institutional sentiment and large stocks.

Brown and Cliff (2004) study investor sentiment and the near- term stock market and find a strong relation regarding aggregate sentiment measures' co-movement with the market. However, avenues to exploit the limited predictability of sentiment with respect to trading strategies are stated narrow. Nevertheless, Fisher and Statman (2000) state in their study that a combination of the sentiment of Wall Street strategists, individual investors and investor newsletter writers is able to provide forecasts of future S&P 500 returns, which can be used in asset allocation purposes in a strategic manner.

In a later study, Brown and Cliff (2005) use survey data on investor sentiment to study sentiment effects on asset valuation. A direct measure of investor sentiment as such is found to predict market returns over the following one to three years. The findings argue against the usefulness of sentiment in predicting near- term, returns, as in their earlier work (Brown & Cliff, 2004). However, Schmeling's (2009) findings contradict the near- term lack of predictability of sentiment as the predictive power of sentiment is found most noticeable for short and medium- term horizons of one to six months. However, the latter study examines the relation for an international market set, while Brown and Cliff (2005) focus on the aggregate U.S. stock market level.

Barberis, Shleifer and Vishny (1997) propose a model of investor sentiment which treats asset earnings as following a random walk. Investors however are unaware of this and believe that earnings are either mean reverting, where they eventually move back towards the mean, or alternatively follow a trend i.e. if earnings increase or decrease, they are likely to follow the same direction further. In the model investors either underreact or overreact to news. The prior is said to be the case more often as stock prices fail to adequately react to news. However, as news of similar nature, either good or bad, saturates the market, overreaction takes place. The intuition is that investors become too bullish and expect prices to continue to rise after a prevailing period of good news.; consequent returns prove however lower. Conversely, after a stream of bad news, investors become too bearish and expect prices to go down further; higher consequent realized returns follow. Schmeling (2009) also finds sentiment to, on average, negatively forecast aggregate stock market returns across different countries, aligning with other earlier work as well (e.g. Baker & Wurgler, 2006; Brown & Cliff, 2005)

In the context of sentiment and news, Tetlock (2007) studies investor sentiment and the role of media in the stock market and finds high media pessimism to exert downward pressure on stock prices before reversal to fundamentals, which for smaller stocks is larger and also slower to reverse. However, the information content of pessimism which is absent from pricing, regarding fundamentals, is largely disputed. Other forms of media, such as social media have also been utilized in examining the relationship between investor sentiment and the stock market. Bollen et al. (2011) focus on whether Twitter mood can predict the stock market and find that Twitter feeds can be used to follow shifts in public mood. However, from the mood dimensions used in the study, changes in only a few proved to align with the changes in the Dow Jones Industrial Average values, with a lag of three to four days. Continuing the media pathway, Siganos et al. (2017) study the relationship between divergence of sentiment and stock market trading by using filtered status updates from Facebook. Divergence of sentiment can be elaborated as the gap between people with positive and negative sentiment. High divergence as such would result in different interpretations of public information and thus differing views among investors, leading to diverging views on stock value. Trading would then take place under such divergence resulting in higher trading volume (Siganos et al., 2017). Tetlock (2007) also finds a relationship between trading volume and sentiment, as high trading volume is seen to follow after exceptionally high or low values of pessimism.

2.4 Do stock prices affect sentiment?

In viewing the relationship between sentiment and stock prices from the counter-perspective, Otoo (1999) examines consumer sentiment and stock prices in the United States. The study finds that households view stock price changes as a key indicator regarding future labor income, as sentiment levels of households which owned stock, as well as of those that did not, showed aligning reactions to changes in stock prices. Essentially, rising stock prices were embraced to signal prospective economic times ahead. Jansen and Nahuis (2003) follow on similar path and acknowledge that stock prices may induce feelings of increased confidence in consumers, regarding the future, and thus encourage spending.

Jansen and Nahuis (2003) study the relationship between stock market developments and consumer confidence. They find stock returns and changes in sentiment to be positively correlated for nine out of the eleven European countries studied. Furthermore, stock returns were found to Granger- cause consumer confidence at horizons of two weeks to one month; a relation not found to apply in the opposite direction. In addition, they find the relationship between the stock market and consumer confidence to be influenced more by economy- wide outlooks as opposed to personal finances. Whether changes in stock prices affected sentiment was elaborated by Fisher and Statman (2000) as well. They found that individual investors' sentiment portrayed "bullish" traits after high S&P returns over a month, while for Wall Street strategists, no statistically significant relationship was found between S&P 500 returns and future changes in sentiment. The changes in sentiment for the latter group are thus seen little influenced by stock returns as compared to individual investors.

> *"Returns and contemporaneous sentiment are strongly positively related, returns predict future sentiment, but sentiment does not predict future returns."*
> (Brown & Cliff, 2004, p. 5)

Brown and Cliff (2004) study investor sentiment and its relation to the near- term stock market and find past market returns to be an important influencer of sentiment. Returns are seen to predict future sentiment, but sentiment is not seen to predict future returns. To elaborate, considering a period where relative returns on stocks are higher, and in terms of sentiment, investors are getting optimistic. As the trend continues, an increasing number of investors "jump on the bandwagon" in the light of the prevailing optimism fuelled by the higher relative returns. The bullish market has thus resulted in a time of high sentiment, which was perhaps predictanle by the period of higher relative returns.

3 DATA AND METHODS

3.1 Data

3.1.1 Return Indices

For the Nordic stock markets, country specific all- share indices are used. The study uses monthly data and the data period observed for the return indices ranges from January 1991- December 2017, depending on the index and availability of data. The indices and range of data are outlined below, and the indices plotted in figure 1 for the time period January 1998 – December 2017, along with descriptive statistics.

- OMX Helsinki Gross Index (OMXHGI), Finland
  January 1991 – December 2017
- OMX Copenhagen Gross Index (OMXCGI), Denmark
  December 2001 – December 2017
- OMX Stockholm Gross Index (OMXSGI), Sweden
  December 2002 – December 2017
- Oslo Børs All-share Index (OSEAX), Norway
  January 1991 – December 2017
- OMX Iceland Gross Index, (OMXIGI), Iceland
  April 2004 – December 2017
- OMX Nordic (EUR) Gross Index, (OMXNORDICEURGI), Finland, Denmark, Sweden
  October 2006 – December 2017

The OMX Helsinki, Copenhagen, Stockholm, Iceland and Nordic -Indices are all part of Nasdaq Nordic. Each All-Share Index consists of all the shares listed on the Nasdaq Nordic Exchanges. The Nasdaq OMX Nordic All-Share Index consists of all the shares listed on Nasdaq OMX Helsinki, Nasdaq OMX Copenhagen and Nasdaq OMX Stockholm. The OMX data includes information on different variables, however for this study, only the closing prices are used. In the case of daily data (OMXIGI and OMXNORDICEURGI), the data is transformed into monthly data and in doing so, the last observed daily closing value in a given month is used as the closing value for that whole month. In addition, the index values are transformed into total return values for the analysis. The Gross Index values reflect ordinary and extraordinary dividends. Further information on the indices and their construction can be found from Nasdaq (2018b).

The Oslo Børs All-share Index (OSEAX) consists of all the shares listed on the Oslo Stock Exchange; Oslo Børs. The OSEAX index is adjusted for dividend payments. Further information on the index can be found from Oslo Børs, Oslo Stock Exchange (2019).

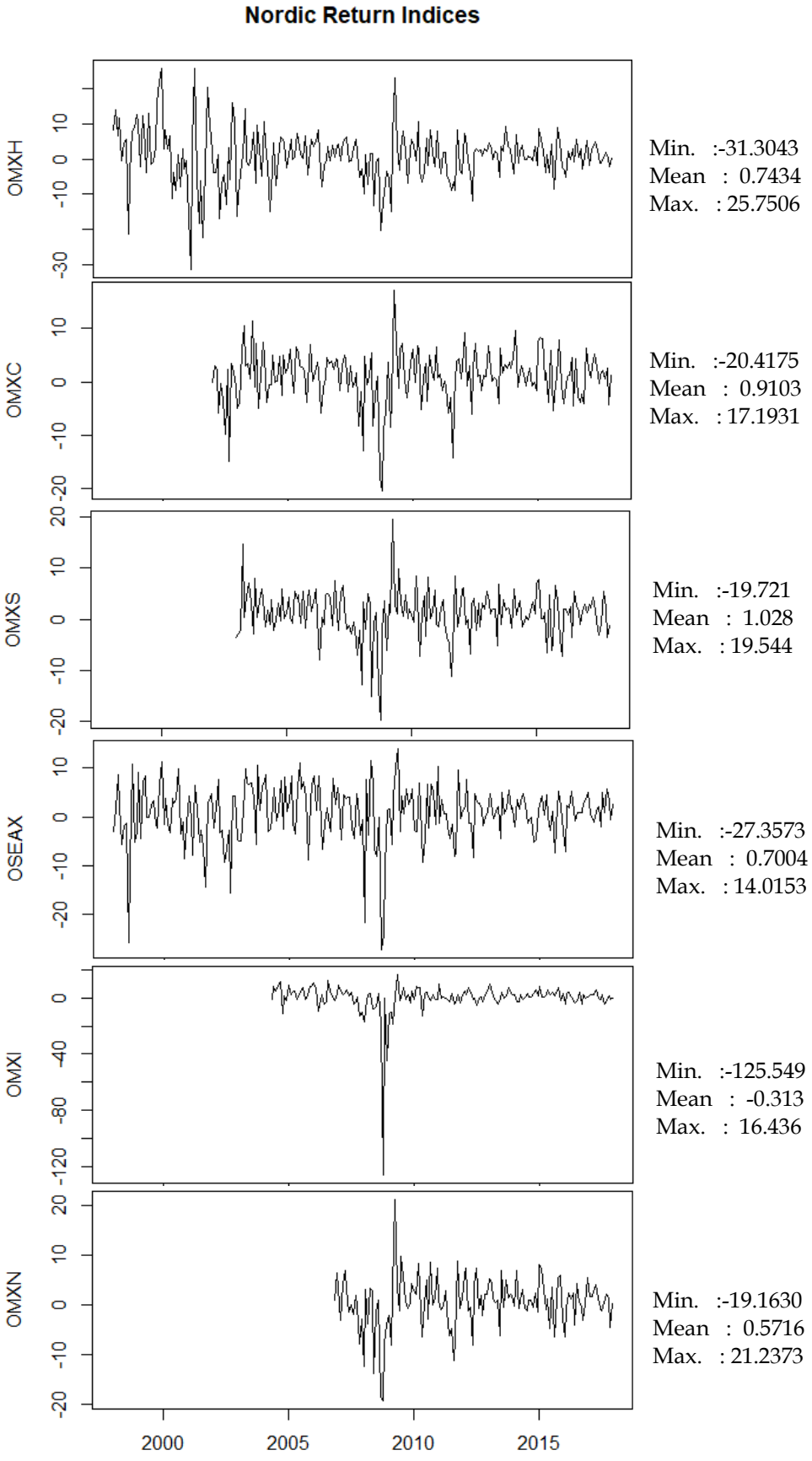


FIGURE 1. Nordic Return Indices, January 1998 – December 2017

3.1.2 Sentiment Indices

A number of different sentiment indices are used for the study. The local country-specific and regional -sentiment indices used are country sentiment indices and country market sentiment indices. For each of the Nordic countries a separate sentiment index is used for both the country and country market -sentiment analysis. However, for Iceland, there is no separate index for the country market sentiment. The regional sentiment indices are the Eurozone region sentiment index and the Eurozone region market sentiment index.

Monthly data is used regarding all indices. The country and market sentiment indices range from January 1998 to December 2017 and are part of the Thomson Reuters MarketPsych Indices. Baker and Wurgler's (2006) investor sentiment index ranges from July 1965 to September 2015 with monthly observations. For this study the data period used is mainly between January 1998 to September 2015. The index and its proxies are further elaborated in section 3.1.2.2.

All the Nordic countries' sentiment indices as well as both Eurozone region and market -sentiment indices are plotted in figures 2 and 3 for the time period January 1998 – December 2017. The first plot represents country –sentiment indices and the second, market -sentiment indices. Descriptive statistics for the indices are outlined in Table 1 below.

TABLE 1. Descriptive Statistics for the Nordic Countries' and Eurozone's -Sentiment Indices

Sentiment	Country Sentiment			Market Sentiment		
Country	Min.	Mean	Max	Min.	Mean	Max.
Finland	-3.1473	0.0000	2.8234	-3.5481	0.0024	3.1553
Denmark	-3.2637	0.0000	2.7478	-2.8422	0.0000	3.0449
Sweden	-3.2747	0.0000	2.7927	-2.2121	0.0000	2.5922
Norway	-2.3339	0.0000	2.7881	-3.1487	-0.0112	3.3520
Iceland	-3.1102	0.0000	3.0822	NA*	NA	NA
Eurozone	-2.7928	0.0000	2.4340	-2.6918	0.0000	2.4251

*Market sentiment data unavailable for Iceland

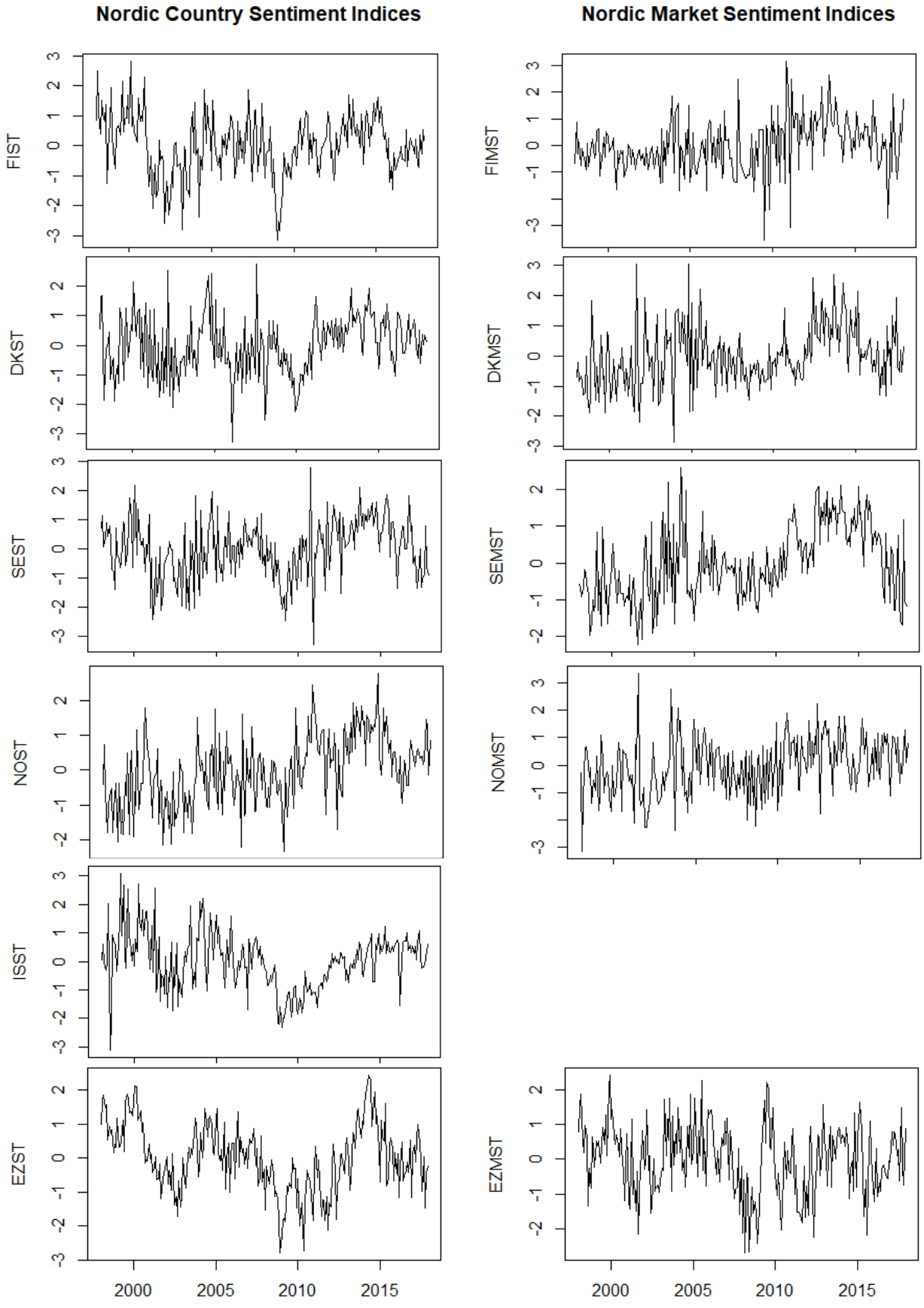
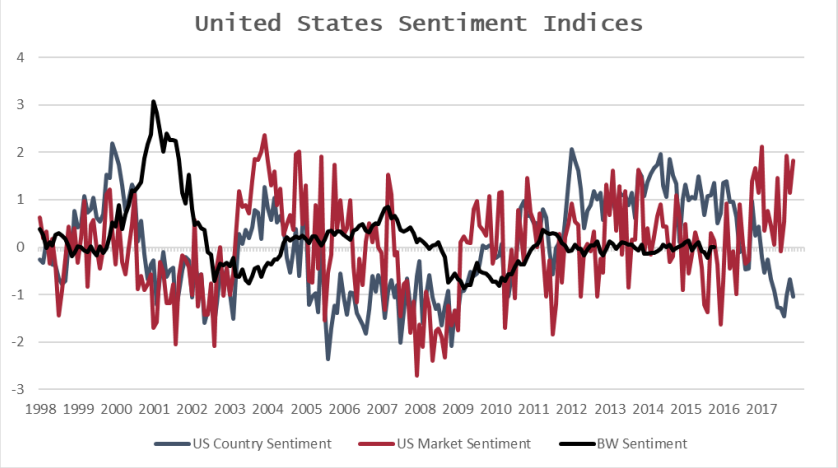


FIGURE 2. and 3. Country and Market -Sentiment Indices, January 1998 – December 2017

For US investor sentiment, three different sentiment indices are used: United States country sentiment index, United States market sentiment index and the revised version of the original sentiment index formed and used by Baker and Wurgler in their 2006 study; (Baker & Wurgler, 2006). The three indices are plotted along with descriptive statistics in figure 4 below.



US Country Sentiment	US Market Sentiment	BW Sentiment
Min. :-2.35708	Min. :-2.70902	Min. :-0.86608
Mean : 0.00000	Mean : 0.00000	Mean : 0.16318
Max. : 2.18760	Max. : 2.35419	Max. : 3.07619

FIGURE 4. United States Sentiment Indices, January 1998 – December 2017

3.1.2.1 Thomson Reuters MarketPsych Indices

The country and country market -sentiment indices are part of the Thomson Reuters MarketPsych Indices (TRMIs) which analyse news and social media in real-time. The country sentiment index is based on references in news and social media: overall positive references, net of negative references. The country market sentiment index (stockIndexSentiment) is based on references in news and social media to the country's top stock indices and shares traded in that country: overall positive references, net of negative references. The data are obtained via the MarketPsych Research platform (MarketPsych, 2019). The data period used in this study starts from the beginning of the availability of the content from January 1998 and ends at December 2017.

The TRMIs are based on relevant text collected over a window of content and evaluated on three different sets of content: news, social media, and the combination of the two. Only English- language text is used. The historical news dataset consists of Reuters news and a number of other conventional news sources gathered by MarketPsych Data. During the year 2005, internet news content collected by LexisNexis was initiated to be included in the archive.

The social media content begins in 1998 with Internet forum and message board content and towards the end of 2008 LexisNexis social media content was added. A year later, tweets were included. Via the use of popularity ranks, the social media content includes largely the top 20 per cent of blogs, microblogs and other financial social media content. In addition, content from an extensive range of less- popular asset- specific blogs and forums was included by MarketPsych data. More information on the TRMI's can be found from the Thomson Reuters MarketPsych Indices, User Guide (2017).

3.1.2.2 Baker and Wurgler's sentiment Index

Baker and Wurgler (2006) in their *paper "Investor sentiment and the cross-section of stock returns"* form a composite index of sentiment based on the common variation in six underlying sentiment proxies. However, the index has since been revised and starting from its previous update March 31, 2016 (version obtained via Wurgler's website; Wurgler (2018)), the New York Stock Exchange (NYSE) turnover was excluded as one of the six original proxies. In the updated data, the change is stated to be the result of the fact that turnover has lost its significance as institutional high- frequency trading has become extremely prevalent, and trading has shifted to a variety of different sites. Following, the index was revised to be based on five sentiment indicators instead of its original six.

The five remaining proxies for sentiment in the revised index are as follows:

1. The closed- end fund discount
   As discussed in section 2.2. earlier, although controversial, the closed- end fund discount is regarded an indicator of sentiment.

2. The number of Initial Public Offerings (IPO's)

3. The average first-day returns on IPO's
   These IPO indicators are based on the IPO market, which is argued to often show sensitivity to sentiment (Baker & Wurgler 2006).

4. The equity share in new issues
   Sentiment may also be seen encompassed within the share of equity issues in total equity and debt issues (Baker & Wurgler, 2006).

5. The dividend premium
   The dividend premium variable may proxy for the relative demand for dividend- paying stocks (Baker & Wurgler, 2006).

Baker and Wurgler (2006) further discuss the fact that each sentiment proxy may entail a non- sentiment related component, in addition to a sentiment component. In order to capture the common component Baker and Wurgler (2006) use principal components analysis towards constructing the index. They form the six sentiment proxies into a composite sentiment index based on their first principal component. In addition, to account for any connection to systematic risks regarding the proxies, another index is formed, in which the proxies have been orthogonalized to a variety of macroeconomic settings. These include the growth in industrial production, the growth in durable, nondurable and services consumption, the growth in employment and a dummy variable for the National Bureau of Economic Research (NBER) recessions. The components of the first index are not orthogonalized. However, Baker and Wurgler (2006) point out that, orthogonalizing to macro variables does not show to qualitatively affect any component of the first index, and hence the overall index. Nevertheless, this study will use the orthogonalized index as the measure for US investor sentiment. Further information on the index and its construction can be found in Baker and Wurgler (2006).

Support for the approach of using the Baker and Wurgler investor sentiment index (as well as the other US sentiment indices) in a study such as this can be found in previous investor sentiment -based studies (Baker et al., 2012; Corredor et al., 2013). Baker et al. (2012) investigate the effect of global and local investor sentiment on six major stock markets (US, Canada, France, Germany, Japan and the UK). Local sentiment indices for each country are constructed using different proxies for investor sentiment, in addition to which, a global sentiment index is formed based on the six local indices. However, interestingly it is emphasized that many of the country local indices share a high degree of resemblance to the United States total sentiment index, while the latter is also the greatest influencer in the global sentiment index. This is seen due to the United States position as the world's "spokesman/ predictor" market.

Corredor et al. (2013) also use Baker and Wurgler's (2006) sentiment index as one of the measures to analyze the sentiment effect in their study. This, despite having acknowledged the fact that the countries studied in their paper were European and Baker and Wurgler's sentiment index was constructed for the US market. Corredor et al. (2013) state Baker and Wurgler's index to show significant positive correlation with all the other indices they created for the study, in addition to the greater explanatory power of the index itself. The latter notion is however left open whether due to the United States' greater ability to spread sentiment or the greater ability of Baker and Wurgler's sentiment index to capture information about sentiment.

3.2 Methods

The study employs simple and multiple linear regression methods to study the relationship between the Nordic stock market returns and the different sentiment indices. The same approach is used in analysing the sentiment- return relationship as well as in examining the relation between local and United States and/ or regional sentiment indices.

The analysis for the study is concised in four sets of regressions which will be outlined next.

In the first set of regressions (equations 1 to 4), it is tested whether US sentiment affects the local and regional stock returns. For US sentiment three sentiment indices are tested separately: The Baker and Wurgler sentiment index along with the Thomson Reuters MarketPsych country and country market -sentiment indices. The regressions are performed separately with same- period sentiment values and previous month values. In addition, all the regressions are run for a second time, for which previous month returns are added as controls.

Equations for the first set of regressions:

$$R_t^{Local} = \alpha + \beta_1 S_t^{BW/US/USM} + \varepsilon \quad (1)$$

$$R_t^{Local} = \alpha + \beta_1 S_t^{BW/US/USM} + \beta_2 R_{t-1}^{Local} + \varepsilon \quad (2)$$

$$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{BW/US/USM} + \varepsilon \quad (3)$$

$$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{BW/US/USM} + \beta_2 R_{t-1}^{Local} + \varepsilon \quad (4)$$

Where:
R_t = Returns observed at time t
α = Regression intercept
β = Coefficient for the regression slope
S_t = Sentiment observed at time t
ε_{it} = Error term
R_{t-1} = Returns observed at time t – 1
S_{t-1} = Sentiment observed at time t- 1

In the second set of regressions (equations 5 to 10), the focus is shifted to solely predictive regressions, which begin with testing the returns and local sentiment relation. Additional models are introduced in which components for the regional and US sentiment are added. Again, the regressions are run a second time with the inclusion of previous month returns as controls.

Equations added for the second set of regressions:

$$R_t^{\text{Local}} = \alpha + \beta_1 S_{t-1}^{\text{Local Country/ Market}} + \varepsilon \quad (5)$$

$$R_t^{\text{Local}} = \alpha + \beta_1 S_{t-1}^{\text{Local Country/ Market}} + \beta_2 R_{t-1}^{\text{Local}} + \varepsilon \quad (6)$$

$$R_t^{\text{Local}} = \alpha + \beta_1 S_{t-1}^{\text{Local Country/ Market}} + \beta_2 S_{t-1}^{\text{Eurozone/US -Country/ Market, / BW}} + \varepsilon \quad (7)$$

$$R_t^{\text{Local}} = \alpha + \beta_1 S_{t-1}^{\text{Local Country/ Market}} + \beta_2 S_{t-1}^{\text{Eurozone/US -Country/ Market, /BW}} + \beta_3 R_{t-1}^{\text{Local}} + \varepsilon \quad (8)$$

$$R_t^{\text{Local}} = \alpha + \beta_1 S_{t-1}^{\text{Local Country/ Market}} + \beta_2 S_{t-1}^{\text{Eurozone Country/ Market}} + \beta_3 S_{t-1}^{\text{US County/ Market, / BW}} + \varepsilon \quad (9)$$

$$R_t^{\text{Local}} = \alpha + \beta_1 S_{t-1}^{\text{Local Country/ Maket}} + \beta_2 S_{t-1}^{\text{Eurozone Country/ Market}} + \beta_3 S_{t-1}^{\text{US Country/ Market, /BW}} + \beta_4 R_{t-1}^{\text{Local}} + \varepsilon \quad (10)$$

The second set of regressions are performed with both the local/ regional country and country market -sentiment indices. When using local/ regional market sentiment indices, the corresponding US and regional sentiment indices are market based as well. The BW sentiment index is however, run with both country and country market- sentiment indices.

Next, in the third set of regressions (equations 11 - 18) the analysis is shifted to examine the constituents of local and regional sentiment in relation to US and regional sentiment. The regressions are performed separately with same- period sentiment values and previous month values. In addition, all the regressions are run for a second time, for which previous month sentiment levels are added as controls.

Equations for the third set of regressions:

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 S_t^{\text{BW/ US Country/ Market}} + \varepsilon \quad (11)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 S_t^{\text{BW/ US Country/ Market}} + \beta_2 S_{t-1}^{\text{Local Country/ Market}} + \varepsilon \quad (12)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 S_{t-1}^{\text{BW/ US Country/ Market}} + \varepsilon \quad (13)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 S_{t-1}^{\text{BW/ US Country/ Market}} + \beta_2 S_{t-1}^{\text{Local Country/ Market}} + \varepsilon \quad (14)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 S_t^{\text{BW/ US Country/ Market}} + \beta_2 S_t^{\text{Eurozone Country/ Market}} + \varepsilon \quad (15)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 S_t^{\text{BW/ US Country/ Market}} + \beta_2 S_t^{\text{Eurozone Country/ Market}} + \beta_3 S_{t-1}^{\text{Local Country/ Market}} + \varepsilon \quad (16)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 S_{t-1}^{\text{BW/ US Country/ Market}} + \beta_2 S_{t-1}^{\text{Eurozone Country/ Market}} + \varepsilon \quad (17)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 S_{t-1}^{\text{BW/ US Country/ Market}} + \beta_2 S_{t-1}^{\text{Eurozone Country/ Market}} + \beta_3 S_{t-1}^{\text{Local Country/ Market}} + \varepsilon \quad (18)$$

As with the second set of regressions, the third set above is also performed with both the local/ regional country and country market -sentiment indices. When using local/ regional market sentiment indices, the corresponding US and regional sentiment indices are market based as well. The BW sentiment index is however again, run with both country and country market- sentiment indices.
Following, in the final set of regressions (equations 19 - 22) a counter- perspective on the return- sentiment relationship is taken, and the focus is on examining the sentiment- return relation.

Equations for the fourth set of regressions:

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 R_{t-1}^{\text{Local}} + \varepsilon \quad (19)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 R_{t-1}^{\text{Local}} + \beta_2 S_{t-1}^{\text{Local Country/ Market}} + \varepsilon \quad (20)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 R_{t-1}^{\text{Local}} + \beta_2 R_{t-1}^{\text{Nordic}} + \varepsilon \quad (21)$$

$$S_t^{\text{Local Country/ Market}} = \alpha + \beta_1 R_{t-1}^{\text{Local}} + \beta_2 R_{t-1}^{\text{Nordic}} + \beta_3 S_{t-1}^{\text{Local Country/ Market}} + \varepsilon \quad (22)$$

The final set of regressions are performed for both local/ regional country and country market -sentiment indices. Solely predictive regressions are included, through which it is tested if previous month local and regional returns affect following month sentiment levels. All the regressions are run for a second time, for which previous month sentiment levels are added as controls.

4 EMPIRICAL RESULTS AND DISCUSSION

4.1 Correlations Between Time- Series

TABLE 2. Correlations Between Time- Series

	OMXH	*OMXC*	*OMXS*	*OSLOE*	*OMXI*	*OMXN*	*FIST*	*DKST*	*SEST*	*NOST*	*ISST*	*EZST*	*USST*	*FIMST*	*DKMST*	*SEMST*	*NOMST*	*EZMST*	*USMST*	*BWST*
OMXH	1,00																			
OMXC	0,74	1,00																		
OMXS	0,77	0,79	1,00																	
OSLOE	0,57	0,77	0,76	1,00																
OMXI	0,33	0,52	0,45	0,46	1,00															
OMXN	0,90	0,92	0,93	0,80	0,49	1,00														
FIST	0,23	0,16	0,05	0,10	0,20	0,15	1,00													
DKST	-0,04	0,01	-0,10	0,06	0,06	-0,12	0,27	1,00												
SEST	0,10	0,09	0,03	0,09	0,17	0,07	0,50	0,35	1,00											
NOST	0,07	0,10	0,12	0,17	0,13	0,13	0,32	0,28	0,41	1,00										
ISST	0,13	0,11	0,05	0,15	0,30	0,02	0,29	0,20	0,20	0,03	1,00									
EZST	0,19	0,20	0,10	0,17	0,25	0,14	0,50	0,35	0,45	0,15	0,43	1,00								
USST	0,14	0,21	0,11	0,19	0,21	0,22	0,37	0,40	0,45	0,37	0,25	0,45	1,00							
FIMST	0,09	0,06	0,02	0,03	0,00	0,06	0,16	0,12	0,15	0,28	-0,03	-0,01	0,30	1,00						
DKMST	0,06	0,24	0,14	0,12	0,19	0,19	0,08	0,23	0,17	0,20	0,04	0,16	0,27	0,11	1,00					
SEMST	0,01	0,15	0,10	0,07	0,20	0,18	0,08	0,24	0,35	0,39	-0,01	0,08	0,47	0,36	0,34	1,00				
NOMST	-0,06	0,12	0,13	0,14	0,10	0,13	0,03	0,05	0,03	0,28	0,07	-0,06	0,16	0,17	0,17	0,16	1,00			
EZMST	0,50	0,55	0,56	0,54	0,29	0,56	0,24	0,11	0,16	0,12	0,21	0,50	0,23	0,05	0,15	0,10	0,05	1,00		
USMST	0,42	0,52	0,52	0,56	0,38	0,59	0,24	0,18	0,17	0,24	0,19	0,32	0,40	0,19	0,24	0,19	0,18	0,59	1,00	
BWST	-0,17	-0,05	-0,14	-0,12	0,12	-0,11	0,07	0,04	-0,04	-0,12	0,22	0,14	-0,13	-0,17	-0,14	-0,28	-0,15	-0,09	-0,25	1,00

OMXH: OMX Helsinki Total Return Index
OMXC: OMX Copenhagen Total Return Index
OMXS: OMX Stockholm Total Return Index
OSLOE: Oslo Børs All-share Index
OMXI: OMX Iceland Total Return Index
OMXN: OMX Nordic (EUR) Total Return Index

FIST: Country Sentiment, Finland
DKST: Country Sentiment, Denmark
SEST: Country Sentiment, Sweden
NOST: Country Sentiment, Norway
ISST: Country Sentiment, Iceland
EZST: Region Sentiment, Eurozone
USST: Country Sentiment, United States

FIMST: Market Sentiment, Finland
DKMST: Market Sentiment, Denmark
SEMST: Market Sentiment, Sweden
NOMST: Market Sentiment, Norway
EZMST: Market Sentiment, Eurozone
USMST: Market Sentiment, United States
BWST: Baker and Wurgler's Sentiment Index

Table 2 shows the correlations between the time series. All the Nordic return indices are positively and highly correlated with one another. For the OMX Iceland index the correlations are lower, however still positive. As to the country and market -sentiment indices, with the exception of a few very weak negative associations, the return indices share mainly close to zero or very low positive correlation. However, with regards to the Eurozone and the United States -market sentiment indices, the correlations are positive and moderate.

The country and region sentiment indices share low to moderate level of positive correlation with one another. Interestingly, the correlations between country and market sentiment -indices are in majority of the cases very low, however positive. This also holds mostly true for correlations between the different market indices with one another, with the Eurozone and US -market sentiment indices however sharing a moderate level (0.59) of correlation with one another. The correlation between the three US sentiment -indices is very low and negative (with the BW index) and around 0.4 between US country and market indices. The three indices were illustrated earlier in figure 4.

With the exception of the Baker and Wurgler sentiment index, negative associations are observed only in a few cases. For the BW sentiment index the correlations with the other indices are very low and the strongest relation (-0.28) is found with the Swedish market sentiment index.

4.2 Stock Returns and Sentiment

Tables 3 to 5 show the regression results for the country- specific OMX, and other Nordic -return indices and the sentiment indices. The first column outlines the equations used in the regression models. Regressions are run both with and without the control variable, which is the previous month returns component. For all the sentiment variables, the table presents coefficients, standard errors and the adjusted coefficients of determination (R^2). Statistically significant results are emphasized with corresponding significance codes.

4.2.1 Stock Returns and US Sentiment

As discussed in the data section, the overall analysis is conducted via four sets of regressions. Table 3 presents the results from the first set of regressions in which the relationship between the return indices and United States sentiment is examined. The analysis is performed with both same- period and predictive -regressions. Three separate sentiment indices for the United States are used.

In general, the results do seem to advocate the position of the US, and US market sentiment, to hold strong influence in foreign stock markets. As contemplated in Corredor et al. (2013) the higher explanatory power of the BW index (as compared to the other sentiment indices used in the study) was seen to either be the result of the BW index "capturing more sentiment", or the role of the United States as a sort of predictor market in the world economy. The cited study concluded to kneel more on the prior notion. In this study, however, the capacity of prevailing sentiment levels in the US, to indeed spread to other markets to the extent of influencing stock returns seems rather credible. One of the reasons behind the statement lies in the fact that unlike in the study by Corredor et al. (2013), the (country and market) sentiment indices, US and that of the other countries, used in this study are identical in construction. And while results are not unanimous across all the countries, results show strong indication for some.

TABLE 3. Regression results, Equations 1–4, Country and Region Specific -Return Indices and US Sentiment, Finland, Denmark, Sweden, Norway, Iceland, OMX Nordic (EUR) GI

Index, Country	OMX Helsinki GI Finland						OMX Copenhagen GI Denmark						OMX Stockholm GI Sweden					
Control	No			Yes			No			Yes			No			Yes		
Returns t-1 ($\beta_2 R_{t-1}^{Local}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$R_t^{Local} = a + \beta_1 S_t^{BW} + \varepsilon$	-1.435*	0.744	0.009	-1.078	0.733	0.053	-0.589	1.022	-0.004	-0.607	1.055	0.037	-1.932*	1.078	0.014	-1.899*	1.080	0.021
$R_t^{Local} = a + \beta_1 S_{t-1}^{BW} + \varepsilon$	-0.881	0.747	0.001	-0.507	0.735	0.047	-1.399	1.000	0.006	-1.277	1.002	0.044	-1.915*	1.076	0.014	-1.805*	1.089	0.019
$R_t^{Local} = a + \beta_1 S_t^{US\ Country} + \varepsilon$	2.953***	0.920	0.038	2.437***	0.906	0.088	1.305*	0.668	0.015	1.361**	0.657	0.052	1.335**	0.655	0.017	1.334**	0.653	0.025
$R_t^{Local} = a + \beta_1 S_{t-1}^{US\ Country} + \varepsilon$	-0.451	0.937	-0.003	-1.254	0.924	0.065	0.594	0.674	-0.001	0.345	0.672	0.031	0.582	0.662	-0.001	0.429	0.668	0.004
$R_t^{Local} = a + \beta_1 S_t^{US\ Market} + \varepsilon$	3.158***	0.445	0.171	2.825***	0.463	0.188	2.448***	0.295	0.262	2.358***	0.305	0.264	2.362***	0.292	0.265	2.451***	0.310	0.264
$R_t^{Local} = a + \beta_1 S_{t-1}^{US\ Market} + \varepsilon$	0.636	0.492	0.003	-0.242	0.526	0.061	1.159***	0.337	0.054	0.904**	0.394	0.056	0.496	0.341	0.006	0.278	0.403	0.004
Number of Obs.	213 - 296						165 - 192						152-180					

Index, Country	Oslo Børs All-share Index Norway						OMX Iceland GI Iceland						OMX Nordic (EUR) GI Finland, Denmark, Sweden					
Control	No			Yes			No			Yes			No			Yes		
Returns$_{t-1}$ ($\beta_2 R_{t-1}^{Local}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$R_t^{Local} = a + \beta_1 S_t^{BW} + \varepsilon$	-0.765	0.579	0.003	-0.648	0.571	0.028	4.499	3.076	0.008	3.052	3.157	0.028	-1.647	1.471	0.002	-1.616	1.445	0.064
$R_t^{Local} = a + \beta_1 S_{t-1}^{BW} + \varepsilon$	-0.836	0.580	0.004	-0.639	0.572	0.028	2.854	3.077	-0.001	2.036	3.079	0.024	-2.697*	1.448	0.023	-2.331	1.431	0.073
$R_t^{Local} = a + \beta_1 S_t^{US\ Country} + \varepsilon$	2.705***	0.727	0.051	2.649***	0.713	0.087	0.343	1.726	-0.006	0.849	1.723	0.024	2.01**	0.928	0.027	2.126**	0.910	0.088
$R_t^{Local} = a + \beta_1 S_{t-1}^{US\ Country} + \varepsilon$	0.875	0.748	0.002	0.336	0.756	0.035	0.745	1.723	-0.005	0.695	1.708	0.023	0.439	0.942	-0.006	-0.077	0.939	0.050
$R_t^{Local} = a + \beta_1 S_t^{US\ Market} + \varepsilon$	3.358***	0.322	0.310	3.284***	0.339	0.309	4.425***	0.851	0.138	4.169***	0.879	0.143	3.077***	0.362	0.349	2.965***	0.385	0.348
$R_t^{Local} = a + \beta_1 S_{t-1}^{US\ Market} + \varepsilon$	1.339***	0.382	0.045	0.944**	0.461	0.051	3.428***	0.881	0.080	3.106***	0.962	0.082	0.943**	0.448	0.025	0.226	0.557	0.051
Number of Obs.	213 – 296						137 - 164						107 - 134					

Significance codes:

0%	-	1%	***
1%	-	5%	**
5%	-	10%	*

* R_t^{Local}: Local return index
* S_t^{BW}: Baker and Wurgler's (2006) sentiment index (orthogonalized version)
* $S_t^{x\ Country}$: Country sentiment index of x country
* $S_t^{x\ Market}$: Market sentiment index of x country
*The OMX Gross Indices (GI) consist of all shares listed on each of the exchanges.

Results show US market sentiment to produce the most significant results with regards to all the sentiment indices used in the study. This is, however, more prominent for same- period relationships. The returns- US market sentiment same- period regressions prove statistically highly significant for all the return indices, both with and without the control. At best, in the same- period single explanatory variable models, US market sentiment is able to explain 34,9 per cent of the variation in returns for the OMX Nordic All- Share Index, and 31,0 per cent for the OSEAX. Even after controlling for previous month returns, these figures are 34,8 per cent and 30,9 per cent respectively. For Iceland, for which the figure is the lowest, US market sentiment is nevertheless able to explain 13,8 per cent of the OMX Iceland return variation.

For all the return indices, the US market sentiment - returns relationship was positive, following the intuition of high sentiment- relatively higher contemporaneous returns and vice- versa. A similar and statistically significant relationship was retained with predictive regressions for Denmark, Norway and Iceland. This would suggest that high US market sentiment levels in the previous month are translated into relatively higher returns for the OMX Copenhagen, OSEAX, and OMX Iceland in the following month, and vice- versa. This would contradict the first hypothesis of the study in terms of the negative sentiment- return relation. However, the underlying reason explaining the result might simply point towards the short prediction period (1 month), in which case the negative relation would emerge in later months.

For US country sentiment, same -period regressions produce highly significant coefficients for Norway and Finland, even after controlling for previous month returns. Results show a positive relationship: When US (country) sentiment is high, contemporaneous returns tend to be relatively higher for the OMX Helsinki and OSEAX, and when sentiment is low, contemporaneous returns tend to be relatively lower for these indices. A similar relationship is observed for the other countries as well, but at a lower significance level, while Iceland is the exception with no statistically significant results to report. Predictive regressions with US country sentiment produce no statistically significant results with regards to all the return indices.

The Baker and Wurgler sentiment index proves overall insignificant in explaining the returns. For Denmark, Norway and Iceland, the index shows no statistically significant relation with the respective return indices, while for Finland and the Nordic index, same- period regression coefficients, significant at the 10 per cent level, prove insignificant once adding the control variable. Sweden is the only exception, for which coefficients, however significant only at the 10 per cent level, retain significance when run again with the control. These coefficients are negative, implying a negative relation between the OMX Stockholm and the BW index. The results differ from for example Corredor et al. (2013) who found the BW index to produce, in many cases, significant results in their study regarding the sentiment effect in stock markets. However, the effect was studied on returns of distinct portfolios as opposed to the aggregate stock market and on markets (France, Germany, Spain and the UK) not part of the Nordics.

As can be observed, results vary greatly depending on the US sentiment index used. The disparity of results comes however with little surprise as the indices themselves are very different; they measure sentiment in very different ways. As observed in section 3.1.2, the constituents of the BW index are market based and highly quantifiable whereas the TRMI's are based on very different data: text analysis from news and social media. The differences are also observed with regards to the correlations. While, the country and market -sentiment indices share a low-moderate level of correlation (0,40) as seen from Table 2, corresponding figures with the BW index are very low -0,13 for the country sentiment and -0,25 for the market sentiment.

4.2.2 Stock Returns and Local, Regional and US -Sentiment

Progressing to the second set of regressions, the focus is solely on predictive models. The results are presented in Table 4 and Table 5.

A quick glance at the result tables reveals that results vary with regards to the different countries and sentiment indices. Local and regional -sentiment show a negative relation with the Danish and Swedish markets, for which statistically significant results are found for the local country sentiment and Eurozone region sentiment. Regarding the latter, the relationship holds true for OSEAX as well, with coefficients across the three countries ranging from -0.756 (Sweden) to -1.147 (Denmark). For all three countries, the relationship is negative implying that relatively higher returns are consequent to a period of low local and/ or Eurozone -sentiment in the previous month. Conversely, high sentiment in the previous month is expected to produce relatively lower returns in the following month. These findings support the first hypothesis of the study and align with earlier work (e.g. Baker & Wurgler, 2006; Brown & Cliff, 2005; Schmeling, 2009) as well.

For OMX Helsinki and OMX Iceland, the second part of the analysis fails to produce adequate evidence in favour of sentiment affecting the countries' stock returns. For OSEAX, local country and market sentiment show no statistically significant relationship, neither does US country sentiment. However, as observed earlier in the single variable predictive US market sentiment regressions, both Danish and Norwegian returns remain positively affected by US market sentiment (with the coefficients falling within the same range).

The BW index portrays statistically significant coefficients at the 10 per cent level with regards to OSEAX, OMXS and OMXN. This is true for local regional (Eurozone) sentiment as well, with regards to the OMX Nordic returns, however, only in models with the previous month returns added as controls. The coefficients in all cases are negative, implying the low sentiment- relatively higher following month returns relationship discussed earlier.

TABLE 4. Regression results, Equations 5–10, Country Specific Return Indices and Local, Regional, and US -sentiment, Finland, Denmark, Sweden

Index, Country	OMX Helsinki GI Finland						OMX Copenhagen GI Denmark						OMX Stockholm GI Sweden					
Control	No			Yes			No			Yes			No			Yes		
Returns *t-1* ($\beta_n R_{t-1}^{Local}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Country} + \varepsilon$	0.577	0.488	0.002	0.124	0.487	0.060	-0.567	0.362	0.008	-0.594*	0.359	0.044	-0.797**	0.350	0.023	-0.884**	0.352	0.036
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Country} +$	0.586	0.490	0.001	0.152	0.487	0.061	-0.551	0.361	0.012	-0.572	0.356	0.056	-0.799**	0.348	0.034	-0.885**	0.349	0.051
$\beta_2 S_{t-1}^{Eurozone\ Country} + \varepsilon$	-0.702	0.657		-0.867	0.638		-0.616	0.454		-0.845*	0.451		-0.756*	0.439		-0.846*	0.439	
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Country} +$	0.546	0.489	-0.002	0.098	0.485	0.061	-0.565	0.362	0.006	-0.593	0.359	0.040	-0.805**	0.350	0.022	-0.887**	0.353	0.033
$\beta_2 S_{t-1}^{US\ Country} + \varepsilon$	-0.506	0.938		-1.255	0.926		0.588	0.671		0.342	0.669		0.614	0.654		0.454	0.658	
$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{Local\ Country} +$	0.589	0.491	-0.003	0.141	0.487	0.061	-0.543	0.361	0.016	-0.567	0.356	0.057	-0.812**	0.347	0.041	-0.892**	0.349	0.054
$\beta_2 S_{t-1}^{Eurozone\ Country} +$	-0.655	0.693		-0.664	0.671		-0.805*	0.475.		-0.987**	0.470		-0.955**	0.457		-1.006**	0.456	
$\beta_3 S_{t-1}^{US\ County} + \varepsilon$	-0.214	0.987		-0.960	0.973		0.940	0.699		0.747	0.690		1.023	0.677		0.865	0.677	
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Market} + \varepsilon$	-0.024	0.495	-0.004	-0.208	0.481	0.061	-0.216	0.301	-0.003	-0.390	0.302	0.038	-0.146	0.365	-0.005	-0.213	0.365	0.003
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Market} +$	-0.066	0.492	0.009	-0.208	0.482	0.057	-0.292	0.297	0.029	-0.382	0.301	0.042	-0.199	0.365	0.004	-0.225	0.366	0.001
$\beta_2 S_{t-1}^{Eurozone\ Market} + \varepsilon$	0.990**	0.488		-0.007	0.550		0.958***	0.356		0.542	0.423		0.565	0.352		0.347	0.426	
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Market} +$	-0.143	0.502	-0.001	-0.177	0.487	0.058	-0.288	0.293	0.054	-0.366	0.299	0.059	-0.160	0.364	0.002	-0.205	0.366	0.000
$\beta_2 S_{t-1}^{US\ Market} + \varepsilon$	0.662	0.501		-0.212	0.533		1.182***	0.337		0.887**	0.394		0.500	0.342		0.270	0.404	
$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{Local\ Market} +$	-0.083	0.502	0.005	-0.168	0.490	0.054	-0.304	0.294	0.052	-0.366	0.300	0.055	-0.191	0.365	0.001	-0.217	0.367	-
$\beta_2 S_{t-1}^{Eurozone\ Market} +$	0.929	0.603		0.128	0.628		0.366	0.432		0.175	0.463		0.401	0.433		0.277	0.467	0.004
$\beta_3 S_{t-1}^{US\ Market} + \varepsilon$	0.106	0.616		-0.271	0.610		0.978**	0.415		0.818*	0.436		0.274	0.420		0.165	0.442	
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Country} +$	0.592	0.522	0.014	0.122	0.526	0.064	-0.632	0.389	0.016	-0.659*	0.386	0.055	-0.653	0.413	0.024	-0.768*	0.417	0.033
$\beta_2 S_{t-1}^{BW} + \varepsilon$	-1.620**	0.798		-1.082	0.790		-1.171	1.001		-0.998	1.006		-1.311	1.147		-1.112	1.157	
$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{Local\ Country} +$	0.605	0.521	0.019	0.149	0.523	0.070	-0.621	0.387	0.024	-0.642*	0.382	0.078	-0.619	0.411	0.038	-0.734*	0.414	0.050
$\beta_2 S_{t-1}^{Eurozone\ Country} +$	-0.987	0.740		-1.196*	0.723		-0.802	0.513		-1.147**	0.512		-0.882*	0.504		-0.955*	0.506	
$\beta_3 S_{t-1}^{BW} + \varepsilon$	-1.728**	0.794		-1.190	0.788		-1.227	0.998		-1.066	0.994		-1.424	1.141		-1.189	1.147	
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Market} +$	-0.176	0.553	0.009	-0.316	0.539	0.066	-0.181	0.333	0.002	-0.363	0.333	0.045	-0.058	0.422	0.008	-0.123	0.424	0.012
$\beta_2 S_{t-1}^{BW} + \varepsilon$	-1.597**	0.809		-1.133	0.796		-1.390	0.999		-1.271	0.997		-1.966*	1.081		-1.884*	1.093	
$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{Local\ Market} +$	-0.200	0.551	0.019	-0.317	0.540	0.061	-0.242	0.329	0.029	-0.352	0.333	0.044	-0.124	0.422	0.017	-0.145	0.424	0.012
$\beta_2 S_{t-1}^{Eurozone\ Market} +$	0.924*	0.525		-0.026	0.592		0.897**	0.382		0.412	0.457		0.569	0.379		0.448	0.458	
$\beta_3 S_{t-1}^{BW} + \varepsilon$	-1.478*	0.808		-1.133	0.798		-1.384	0.985		-1.284	0.998		-1.924*	1.077		-1.944*	1.095	
Number of Obs.	213 – 296						165 – 192						152-180					

Significance codes:

0%	-	1%	***
1%	-	5%	**
5%	-	10%	*

* R_t^{Local}: Local return index
* S_t^{BW}: Baker and Wurgler's (2006) sentiment index (orthogonalized version)
* $S_t^{x\ Country}$: Country sentiment index of x country
* $S_t^{x\ Market}$: Market sentiment index of x country
*The OMX Gross Indices (GI) consist of all shares listed on each of the exchanges.

TABLE 5. Regression results, Equations 5–10, Country Specific Return Indices and Local, Regional, and US -sentiment, Norway, Iceland, OMX Nordic (EUR) GI

Index, Country	Oslo Børs All-share Index Norway						OMX Iceland GI Iceland						OMX Nordic EUR GI Finland, Denmark, Sweden					
Control	No			Yes			No			Yes			No			Yes		
Returns *t-1* ($\beta_n R_{t-1}^{Local}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Country} + \varepsilon$	0.220	0.390	-0.003	0.017	0.388	0.034	1.505	1.474	0.000	0.920	1.489	0.025	-0.644	0.576	0.002	-0.946*	0.566	0.070
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Country} +$	0.250	0.391	-0.001	0.040	0.387	0.044	1.495	1.479	-0.006	0.918	1.494	0.018						
$\beta_2 S_{t-1}^{Eurozone\ Country} + \varepsilon$	-0.645	0.524		-0.953*	0.520		0.294	1.151		0.094	1.146							
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Country} +$	0.196	0.391	-0.002	0.016	0.389	0.031	1.612	1.489	-0.004	1.013	1.504	0.020	-0.732	0.590	-0.002	-0.972*	0.579	0.063
$\beta_2 S_{t-1}^{US\ Country} + \varepsilon$	0.853	0.750		0.335	0.758		0.984	1.736		0.842	1.725		0.688	0.961		0.225	0.949	
$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{Local\ Country} +$	0.224	0.390	0.006	0.035	0.387	0.044	1.602	1.497	-0.010	1.017	1.511	0.014						
$\beta_2 S_{t-1}^{Eurozone\ Country} +$	-0.923*	0.550		-1.110**	0.543		0.125	1.200		-0.061	1.192							
$\beta_3 S_{t-1}^{US\ County} + \varepsilon$	1.268	0.787		0.796	0.786		0.932	1.811		0.867	1.797							
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Market} + \varepsilon$	-0.066	0.384	-0.004	-0.237	0.380	0.035							0.966**	0.443	0.027	0.329	0.534	0.052
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Market} +$	-0.118	0.380	0.022	-0.225	0.380	0.036												
$\beta_2 S_{t-1}^{Eurozone\ Market} + \varepsilon$	1.036***	0.385		0.513	0.453													
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Market} +$	-0.308	0.381	0.044	-0.336	0.380	0.050							0.639	0.543	0.028	0.288	0.574	0.045
$\beta_2 S_{t-1}^{US\ Market} + \varepsilon$	1.395***	0.389		0.994**	0.464								0.570	0.549		0.118	0.599	
$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{Local\ Market} +$	-0.289	0.382	0.042	-0.327	0.383	0.046												
$\beta_2 S_{t-1}^{Eurozone\ Market} +$	0.360	0.470		0.141	0.495													
$\beta_3 S_{t-1}^{US\ Market} + \varepsilon$	1.180	0.480		0.934*	0.510													
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Country} +$	0.098	0.417	0.008	-0.075	0.415	0.040	1.739	1.749	-0.001	1.044	1.781	0.019	-0.905	0.700	0.029	-1.329*	0.695	0.096
$\beta_2 S_{t-1}^{BW} + \varepsilon$	-1.191*	0.636		-1.016	0.629		2.832	3.077		2.080	3.088		-2.775*	1.445		-2.368*	1.413	
$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{Local\ Country} +$	0.135	0.418	0.010	-0.042	0.414	0.051	1.724	1.756	-0.008	1.040	1.788	0.012						
$\beta_2 S_{t-1}^{Eurozone\ Country} +$	-0.719	0.591		-1.060*	0.589		0.474	1.384		0.235	1.382							
$\beta_3 S_{t-1}^{BW} + \varepsilon$	-1.227*	0.638		-1.049*	0.627		2.872	3.090		2.104	3.102							
$R_t^{Local} = a + \beta_1 S_{t-1}^{Local\ Market} +$	-0.123	0.419	0.008	-0.272	0.415	0.042							0.947*	0.497	0.046	0.325	0.600	0.067
$\beta_2 S_{t-1}^{BW} + \varepsilon$	-1.237*	0.638		-1.060*	0.630								-2.600*	1.431		-2.348	1.436	
$R_t^{Local} = \alpha + \beta_1 S_{t-1}^{Local\ Market} +$	-0.160	0.414	0.033	-0.254	0.415	0.043												
$\beta_2 S_{t-1}^{Eurozone\ Market} +$	1.037**	0.413		0.555	0.488													
$\beta_3 S_{t-1}^{BW} + \varepsilon$	-1.105*	0.633		-1.034	0.630													
Number of Obs.	213 – 296						137 – 164						107 – 134					

Significance codes:

0%	-	1%	***
1%	-	5%	**
5%	-	10%	*

* R_t^{Local}: Local return index
* S_t^{BW}: Baker and Wurgler's (2006) sentiment index (orthogonalized version)
* $S_t^{x\ Country}$: Country sentiment index of x country
* $S_t^{x\ Market}$: Market sentiment index of x country
*The OMX Gross Indices (GI) consist of all shares listed on each of the exchanges.
*The local sentiment index used for the OMX Nordic return regressions is the Eurozone sentiment index.

At this point, first of the three questions under examination presented at the beginning of this study may be recalled: Does sentiment affect Nordic stock returns? Overall, results show sentiment to affect Nordic stock returns in several cases, confirming the first hypothesis of the study. However, the results vary greatly on the sentiment index used as well as with regards to the different countries analysed. Underlying differences may very likely point to cultural factors. Corredor et al. (2013) also discuss the potential role of cultural and institutional differences in explaining cross- country differences in sentiment effects. Indeed, Schmeling (2009) states institutional quality and cultural factors to be strong determinants of the sentiment-return relation.

4.3 Local and External -Sentiment

In the third part of the analysis, attention is directed towards studying the relationship between the different sentiment indices themselves. The objective is to examine whether US and/ or Regional; Eurozone -sentiment claim any part in the local and regional sentiment indices. The analysis is performed for both country and market sentiment indices.

Tables 6 and 7 show the regression results for the local and regional, country and market -sentiment regressions. The first column outlines the equations used in the regression models. Regressions are run both with and without the control variable, which is now the previous month sentiment component. For all the sentiment variables, the table presents coefficients, standard errors and the adjusted coefficients of determination (R^2). Statistically significant results are emphasized with corresponding significance codes.

4.3.1 Local Country and Regional -Sentiment

As discussed in section 4.2., the role of the US is again seen influential towards foreign markets, and in this case, towards foreign sentiment. Table 6 shows the local country and region -sentiment indices to share statistically significant relationships with US country sentiment. The relations are positive and observable for Finland, Sweden, Norway, and the Eurozone, implicating that when country sentiment in the US is high, contemporaneous country and regional -sentiment in these countries and the Eurozone is expected to be relatively higher as well. While for Finland and the Eurozone, this relation holds only in same- period models, Sweden and Norway show significant results in predictive models as well; high country sentiment in the US is predictive of relatively higher local sentiment in Norway and Sweden in the following month.

In addition to US country sentiment, Finland and Sweden also show sensitivity to contemporaneous sentiment levels in the Eurozone. These countries perhaps view regional sentiment to encompass information relevant enough to affect their own sentiment.

TABLE 6. Regression results, Equations 11–18, Local Country and Region -Sentiment, Finland, Denmark, Sweden, Norway, Iceland, Eurozone

Sentiment, Country	Country Sentiment, Finland						Country Sentiment, Denmark						Region Sentiment, Sweden					
Control	No			Yes			No			Yes			No			Yes		
Local country sentiment t-1 ($\beta_n S_{t-1}^{Local\ Country}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$S_t^{Local\ Country} = a + \beta_1 S_t^{BW} + \varepsilon$	0.111	0.105	0.001	0.003	0.090	0.280	0.061	0.105	-0.003	0.309	0.066	0.088	-0.065	0.103	-0.003	-0.064	0.097	0.115
$S_t^{Local\ Country} = a + \beta_1 S_{t-1}^{BW} + \varepsilon$	0.028	0.105	-0.004	-0.032	0.089	0.280	0.020	0.105	-0.005	0.002	0.100	0.086	-0.100	0.103	-0.000	-0.077	0.097	0.117
$S_t^{Local\ Country} = a + \beta_1 S_t^{US\ Country} + \varepsilon$	0.100	0.124	-0.001	0.211**	0.106	0.284	-0.002	0.123	-0.004	0.124	0.121	0.095	0.072	0.124	-0.003	0.213*	0.118	0.133
$S_t^{Local\ Country} = a + \beta_1 S_{t-1}^{US\ Country} + \varepsilon$	0.187	0.123	0.006	0.135	0.105	0.276	0.193	0.124	0.006	0.193	0.118	0.100	0.246**	0.124	0.012	0.222*	0.116	0.133
$S_t^{Local\ Country} = a + \beta_1 S_t^{BW} +$	0.114	0.105	0.003	0.011	0.089	0.293	0.062	0.106	-0.005	0.031	0.101	0.091	-0.063	0.103	-0.003	-0.053	0.096	0.133
$\beta_2 S_t^{Eurozone\ Country} + \varepsilon$	0.120	0.098		0.183**	0.083		0.076	0.098		0.125	0.094		0.092	0.096		0.216**	0.092	
$S_t^{Local\ Country} = a + \beta_1 S_{t-1}^{BW} +$	0.021	0.104	-0.007	-0.040	0.089	0.276	0.021	0.105	0.000	0.002	0.100	0.087	-0.099	0.103	0.001	-0.078	0.097	0.114
$\beta_2 S_{t-1}^{Eurozone\ Country} + \varepsilon$	0.063	0.097		-0.000	0.083		0.140	0.098		0.117	0.093		0.104	0.096		0.073	0.091	
$S_t^{Local\ Country} = a + \beta_1 S_t^{US\ Country} +$	0.041	0.131	0.003	0.127	0.110	0.300	-0.045	0.131	-0.004	0.072	0.126	0.098	0.055	0.131	-0.006	0.165	0.123	0.136
$\beta_2 S_t^{Eurozone\ Country} + \varepsilon$	0.131	0.091		0.192**	0.077		0.096	0.092		0.119	0.087		0.037	0.092		0.117	0.086	
$S_t^{Local\ Country} = a + \beta_1 S_{t-1}^{US\ Country} +$	0.187	0.130	0.001	0.165	0.110	0.275	0.158	0.130	0.005	0.172	0.124	0.097	0.211	0.130	0.011	0.194	0.122	0.131
$\beta_2 S_{t-1}^{Eurozone\ Country} + \varepsilon$	-0.000	0.091		-0.068	0.077		0.077	0.091		0.047	0.087		0.077	0.091		0.063	0.085	
Number of Obs.	213 – 240						213 - 240						213 - 240					

Sentiment, Country	Country Sentiment, Norway						Country Sentiment, Iceland						Region Sentiment, Eurozone					
Control	No			Yes			No			Yes			No			Yes		
Local country sentiment t-1 ($\beta_n S_{t-1}^{Local\ Country}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$S_t^{Local\ Country} = a + \beta_1 S_t^{BW} + \varepsilon$	-0.188*	0.104	0.011	-0.132	0.094	0.209	-0.044	0.102	-0.004	-0.057	0.093	0.175	-0.052	0.074	-0.002	-0.067	0.069	0.126
$S_t^{Local\ Country} = a + \beta_1 S_{t-1}^{BW} + \varepsilon$	-0.216**	0.104	0.015	-0.132	0.094	0.21	-0.028	0.102	-0.004	-0.049	0.092	0.174	-0.078	0.074	0.001	-0.100	0.069	0.131
$S_t^{Local\ Country} = a + \beta_1 S_t^{US\ Country} + \varepsilon$	0.106	0.124	-0.001	0.206*	0.111	0.215	-0.187	0.120	0.006	-0.114	0.111	0.172	0.451***	0.088	0.096	0.396***	0.082	0.223
$S_t^{Local\ Country} = a + \beta_1 S_{t-1}^{US\ Country} + \varepsilon$	0.270**	0.124	0.016	0.220**	0.110	0.219	0.058	0.121	-0.003	-0.019	0.111	0.168	-0.134	0.093	0.005	0.048	0.090	0.147
$S_t^{Local\ Country} = a + \beta_1 S_t^{BW} +$	-0.182*	0.105	0.010	-0.125	0.094	0.214	-0.048	0.102	-0.005	-0.060	0.093	0.172						
$\beta_2 S_t^{Eurozone\ Country} + \varepsilon$	0.095	0.098		0.129	0.087		-0.079	0.095		-0.053	0.087							
$S_t^{Local\ Country} = a + \beta_1 S_{t-1}^{BW} +$	-0.223**	0.105	0.013	-0.140	0.094	0.213	-0.029	0.102	-0.009	-0.050	0.093	0.171						
$\beta_2 S_{t-1}^{Eurozone\ Country} + \varepsilon$	-0.050	0.097		-0.094	0.087		0.021	0.095		-0.013	0.086							
$S_t^{Local\ Country} = a + \beta_1 S_t^{US\ Country} +$	0.078	0.131	-0.003	0.170	0.117	0.215	-0.177	0.127	0.002	-0.100	0.117	0.169						
$\beta_2 S_t^{Eurozone\ Country} + \varepsilon$	0.062	0.092		0.080	0.081		-0.022	0.089		-0.033	0.081							
$S_t^{Local\ Country} = a + \beta_1 S_{t-1}^{US\ Country} +$	0.305**	0.130	0.014	0.266**	0.116	0.221	0.036	0.128	-0.006	-0.037	0.117	0.165						
$\beta_2 S_{t-1}^{Eurozone\ Country} + \varepsilon$	-0.076	0.091		-0.103	0.081		0.049	0.089		0.039	0.081							
Number of Obs.	213 - 240						213 - 240						213 - 240					

Significance codes:

0%	-	1%	***
1%	-	5%	**
5%	-	10%	*

* S_t^{Local}: Local sentiment index
* S_t^{BW}: Baker and Wurgler's (2006) sentiment index (orthogonalized version)
* $S_t^{x\ Country}$: Country sentiment index of x country
* $S_t^{x\ Market}$: Market sentiment index of x country
*The OMX Gross Indices (GI) consist of all shares listed on each of the exchanges.

All the local country sentiment indices show high sensitivity to previous month local sentiment levels. For Finland, models controlling for previous month local sentiment levels produce R squared values of as high as 0.300. Corresponding values for the other countries and the Eurozone are: Denmark, 0.100; Sweden, 0.136; Norway, 0.219; Iceland, 0.175; and Eurozone, 0.223.

Overall, the results produce anticipated signs and provide support to the second hypothesis of the study: Local sentiment indeed shows sensitivity to external, US and Eurozone -sentiment. However, again, as observed in the sentiment- returns analysis section, results are not unanimous across the different countries and sentiment indices. For Denmark and Iceland, no statistically significant relationships are found between local, US and Eurozone -sentiment. And as to the BW index, perhaps its insignificance in relation to the country and region -sentiment indices stems from the fact that the index itself is more market oriented.

4.3.2 Local and Regional -Market Sentiment

Table 7 shows the regression results for the market sentiment indices. Compared to the country sentiment regressions, the BW index emerges significant in several cases. As expressed in the previous section, the BW index clearly inclines towards being market oriented (which can be observed from its constituents in section 3.1.2.2) and thus seems better suited for the market sentiment analysis as implied by the achievement of significant results in this section. However, while a relation between the index and local indices is established, the negative association causes reservation as it contradicts with the latter part of the second hypothesis, in which a positive relation was predicted. For instance, with regards to Finnish market sentiment, the BW index produces statistically significant results in all the models, same- period as well as predictive. The relationship holds when controlling for previous month local market sentiment as well. Results follow close for Norwegian market sentiment as well. The coefficients are, however, negative, implying that when sentiment is low in the US as estimated by the BW index, contemporaneous, and following period (for predictive regressions) market sentiment in Finland and Norway is relatively higher and vice versa. The negative association is also observed in the negative, however very weak, correlations between the indices -0.15 with Norwegian market sentiment, and -0.17, with Finnish market sentiment.

US market sentiment produces highly significant coefficients, with anticipated signs, in both predictive and same- period models. This is true for Finland, Norway, and the Eurozone, indicating local market sentiment to be positively influenced by higher prevailing (and preceding) levels of US market sentiment and vice versa. Results for the Eurozone are especially interesting as the market sentiment index of the region shows to share a strong relation with the corresponding US index. In the single-variable same- period models, US market sentiment is able to explain 34,0 percent of the variation in Eurozone market sentiment. When controlling for previous month sentiment the explanatory power of the model raises to 38,8 percent. In predictive models corresponding figures are 10,2 per cent and 17,2 per cent.

TABLE 7. Regression results, Equations 11–18, Local Market Sentiment, Finland, Denmark, Sweden, Norway, Eurozone

Sentiment, Country	Market Sentiment, Finland						Market Sentiment, Denmark						Market Sentiment, Sweden					
Control	No			Yes			No			Yes			No			Yes		
Local market sentiment t-1 ($\beta_n S_{t-1}^{Local\ Market}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$S_t^{Local\ Market} = a + \beta_1 S_t^{BW} + \varepsilon$	-0.246**	0.099	0.024	-0.215**	0.100	0.034	-0.015	0.125	-0.005	-0.019	0.114	0.175	-0.024	0.098	-0.004	-0.035	0.083	0.282
$S_t^{Local\ Market} = a + \beta_1 S_{t-1}^{BW} + \varepsilon$	-0.236**	0.099	0.021	-0.205**	0.100	0.033	-0.038	0.125	-0.004	-0.047	0.113	0.175	-0.044	0.098	0.004	-0.057	0.083	0.284
$S_t^{Local\ Market} = a + \beta_1 S_t^{US\ Market} + \varepsilon$	0.190***	0.063	0.032	0.170***	0.064	0.041	0.100	0.079	0.003	0.089	0.071	0.198	0.031	0.064	-0.003	0.032	0.055	0.255
$S_t^{Local\ Market} = a + \beta_1 S_{t-1}^{US\ Market} + \varepsilon$	0.177***	0.064	0.027	0.156**	0.065	0.036	-0.031	0.080	-0.004	0.012	0.072	0.192	0.012	0.064	-0.004	0.029	0.055	0.254
$S_t^{Local\ Market} = a + \beta_1 S_t^{BW} +$	-0.243**	0.100	0.020	-0.212**	0.101	0.030	-0.006	0.126	-0.006	-0.011	0.114	0.173	-0.011	0.098	0.001	-0.028	0.083	0.282
$\beta_2 S_t^{Eurozone\ Market} + \varepsilon$	0.024	0.066		0.026	0.066		0.069	0.083		0.059	0.076		0.095	0.065		0.050	0.055	
$S_t^{Local\ Market} = a + \beta_1 S_{t-1}^{BW} +$	-0.221**	0.099	0.029	-0.191*	0.100	0.040	-0.048	0.125	-0.005	-0.053	0.114	0.173	-0.060	0.097	0.006	-0.066	0.083	0.285
$\beta_2 S_{t-1}^{Eurozone\ Market} + \varepsilon$	0.108*	0.065		0.105	0.065		-0.076	0.082		-0.049	0.075		-0.113*	0.064		-0.062	0.055	
$S_t^{Local\ Market} = a + \beta_1 S_t^{US\ Market} +$	0.245***	0.078	0.034	0.216***	0.080	0.040	0.070	0.098	-0.000	0.074	0.088	0.195	-0.034	0.078	0.001	0.009	0.068	0.253
$\beta_2 S_t^{Eurozone\ Market} + \varepsilon$	-0.095	0.078		-0.076	0.079		0.051	0.098		0.027	0.088		0.110	0.078		0.039	0.069	
$S_t^{Local\ Market} = a + \beta_1 S_{t-1}^{US\ Market} +$	0.160**	0.079	0.024	0.132	0.080	0.033	0.019	0.098	-0.005	0.050	0.089	0.191	0.088	0.079	0.003	0.072	0.068	0.255
$\beta_2 S_{t-1}^{Eurozone\ Market} + \varepsilon$	0.030	0.079		0.118	0.078		-0.085	0.098		-0.065	0.088		-0.130*	0.078		-0.075	0.068	
Number of Obs.	213 - 240						213 - 240						213 - 240					

Sentiment, Country	Market Sentiment, Norway						Market Sentiment, Eurozone					
Control	No			Yes			No			Yes		
Local market sentiment t-1 ($\beta_n S_{t-1}^{Local\ Market}$)												
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$S_t^{Local\ Market} = a + \beta_1 S_t^{BW} + \varepsilon$	-0.225**	0.104	0.017	-0.181*	0.102	0.076	-0.136	0.104	0.003	-0.107	0.095	0.178
$S_t^{Local\ Market} = a + \beta_1 S_{t-1}^{BW} + \varepsilon$	-0.229**	0.104	0.018	-0.173*	0.102	0.075	-0.160	0.104	0.006	-0.104	0.095	0.174
$S_t^{Local\ Market} = a + \beta_1 S_t^{US\ Market} + \varepsilon$	0.184***	0.065	0.029	0.150**	0.064	0.083	0.586***	0.053	0.340	0.505***	0.054	0.388
$S_t^{Local\ Market} = a + \beta_1 S_{t-1}^{US\ Market} + \varepsilon$	0.170**	0.065	0.024	0.126*	0.065	0.077	0.327***	0.062	0.102	0.131*	0.073	0.172
$S_t^{Local\ Market} = a + \beta_1 S_t^{BW} +$	-0.220**	0.104	0.014	-0.177*	0.102	0.073						
$\beta_2 S_t^{Eurozone\ Market} + \varepsilon$	0.035	0.069		0.032	0.067							
$S_t^{Local\ Market} = a + \beta_1 S_{t-1}^{BW} +$	-0.220**	0.104	0.018	-0.165	0.102	0.074						
$\beta_2 S_{t-1}^{Eurozone\ Market} + \varepsilon$	0.072	0.069		0.064	0.067							
$S_t^{Local\ Market} = a + \beta_1 S_t^{US\ Market} +$	0.231***	0.080	0.029	0.182**	0.079	0.081						
$\beta_2 S_t^{Eurozone\ Market} + \varepsilon$	--0.080	0.080		-0.054	0.078							
$S_t^{Local\ Market} = a + \beta_1 S_{t-1}^{US\ Market} +$	0.197**	0.081	0.021	0.142*	0.080	0.073						
$\beta_2 S_{t-1}^{Eurozone\ Market} + \varepsilon$	-0.046	0.080		-0.027	0.078							
Number of Obs.	213 - 240						213 – 240					

Significance codes:	0%	-	1%	***
	1%	-	5%	**
	5%	-	10%	*

* S_t^{Local}: Local sentiment index
* S_t^{BW}: Baker and Wurgler's (2006) sentiment index (orthogonalized version)
* $S_t^{x\ Country}$: Country sentiment index of x country
* $S_t^{x\ Market}$: Market sentiment index of x country
*The OMX Gross Indices (GI) consist of all shares listed on each of the exchanges.

US market sentiment regressions provide strongly in favour of the second hypothesis of the study. Intuitively the results may be considered to suggest that countries whose local sentiment indices project sensitivity to external sentiment perhaps view US and regional market sentiment to portray the general state of stock markets in a sense that in broader terms also signals the condition of the economy in general. This to the extent that it drives the countries' local sentiment in the same direction.

Further, the results again show divergence between the countries. For Denmark, as in the case of country sentiment, no statistically significant relationships exist between local and the other -sentiment indices. Sweden follows along the same trail despite predictive models indicating significance for Eurozone market sentiment, which is however dissolved, after controlling for previous month sentiment, leaving no statistically significant coefficients observable.

As observed earlier, all the countries showed high sensitivity to past local country sentiment. However, an apparent difference is observed when controlling for past local market sentiment. Sensitivity of current market sentiment to past market sentiment proves much higher for Denmark and Sweden when compared to that of country sentiment. This also holds true for Eurozone market sentiment, but to a more subtle extent. For Finland and Norway, the difference is however more profound. Compared to previous month levels of country sentiment, which were seen to strongly affect next-period sentiment levels, the corresponding influence of previous month market sentiment levels is much lower. Perhaps, the dynamic nature of markets themselves, translates into a more dynamic market sentiment in these countries, while in other countries, past sentiment levels remain emphasized.

4.4 Sentiment and Stock Returns

So far it has become apparent that sentiment does indeed have effect on stock returns. This section of the analysis takes the counter- perspective on the sentiment- returns relationship and the focus is on determining the effect of stock returns on sentiment.

Tables 8 and 9 show the regression results for the local and regional country and market -sentiment indices and the local and regional -return indices. The first column outlines the equations used in the regression models. Regressions are run both with and without the control variable, which is again the previous month sentiment component. For all the return variables, the table presents coefficients, standard errors and the adjusted coefficients of determination (R^2). Statistically significant results are emphasized with corresponding significance codes.

4.4.1 Country and Region -Sentiment

Table 8 shows the regression results for local country and regional –sentiment in relation to previous month local and regional stock returns. Significant results are observed mainly for Finland, with previous month OMX- Helsinki returns strongly influencing following period sentiment. As one would expect, the relationship is positive; Higher stock returns in the previous month pave way for relatively higher sentiment in the following month. The (adjusted) coefficient of determination for the single- variable model is 0.088, and when controlling for previous month local sentiment, this figure raises to 0.307. The findings concur with earlier studies (e.g. Brown & Cliff, 2004; Otoo, 1999) in which higher stock returns are seen to have a positive impact on sentiment. For Finland, the results show the effect to be limited to local returns, as past regional returns show no statistically significant relationship with following period sentiment levels.

Interestingly the rest of the Nordic countries do not show similar trait to Finland. For Denmark, Sweden, Norway and Iceland no statistically significant relationship is found between local country sentiment and previous month stock returns, both local and regional. For regional, Eurozone sentiment, past Nordic returns (used to proxy local returns) show to positively influence following period sentiment. However, this relation is only observable when controlling for past sentiment.

The final study hypothesis is supported by the results achieved for Finland, however, as it has become apparent, results are not unanimous across the countries studied. Are Finnish people more inclined to view past local stock returns as a sort of a beacon signalling information regarding more than just the performance of the stock market. This to the extent that it influences country level sentiment. Perhaps, this provides further emphasis on country- specific differences ventured earlier.

TABLE 8. Regression results, Equations 19-22, Local Country and Region -Sentiment and Local and Regional -Returns

Sentiment, Country	**Country Sentiment, Finland**						**Country Sentiment, Denmark**						**Country Sentiment, Sweden**					
Control	No			Yes			No			Yes			No			Yes		
Local country sentiment t-1 ($\beta_n S_{t-1}^{Local\ Country}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$S_t^{Local\ Country} = a + \beta_1 R_{t-1}^{Local} + \varepsilon$	0.040***	0.008	0.088	0.025***	0.007	0.307	0.010	0.014	-0.003	0.009	0.013	0.140	0.014	0.016	-0.001	0.012	0.015	0.105
$S_t^{Local\ Country} = a + \beta_1 R_{t-1}^{Local} +$	0.069**	0.031	0.058	0.042	0.026	0.370	0.051	0.039	-0.002	0.044	0.034	0.251	-0.010	0.047	0.002	-0.003	0.042	0.213
$\beta_2 R_{t-1}^{Nordic} + \varepsilon$	-0.032	0.033		-0.022	0.027		-0.041	0.038		-0.024	0.033		0.034	0.044		0.021	0.039	
Number of Obs.	134 - 240						134 - 192						134 - 180					
Sentiment, Country	**Country Sentiment, Norway**						**Country Sentiment, Iceland**						**Region Sentiment, Eurozone**					
Control	No			Yes			No			Yes			No			Yes		
Local country sentiment t-1 ($\beta_n S_{t-1}^{Local\ Country}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$S_t^{Local\ Country} = a + \beta_1 R_{t-1}^{Local} + \varepsilon$	0.014	0.011	0.003	0.001	0.010	0.204	0.002	0.004	-0.005	0.004	0.004	0.041	0.017	0.013	0.006	0.028**	0.012	0.162
$S_t^{Local\ Country} = a + \beta_1 R_{t-1}^{Local} +$	0.013	0.023	0.011	0.004	0.020	0.248	-0.001	0.004	0.005	0.002	0.004	0.091						
$\beta_2 R_{t-1}^{Nordic} + \varepsilon$	0.014	0.025		0.011	0.022		0.016	0.011		0.015	0.010							
Number of Obs.	134 – 240						134 – 164						134					

Significance codes:

0%	-	1%	***
1%	-	5%	**
5%	-	10%	*

* S_t^{Local}: Local sentiment index
* S_t^{BW}: Baker and Wurgler's (2006) sentiment index (orthogonalized version)
* $S_t^{x\ Country}$: Country sentiment index of x country
* $S_t^{x\ Market}$: Market sentiment index of x country
*The OMX Gross Indices (GI) consist of all shares listed on each of the exchanges.
*The OMX Nordic (EUR) Gross Index (Finland, Denmark, Sweden) is used as the "local" return index for the Eurozone.

4.4.2 Market Sentiment

Table 9 shows the regression results for local country and regional –market sentiment in relation to previous month local and regional stock returns. In contrast to the country sentiment regressions, results are more versatile for the market sentiment regressions. Danish and Norwegian -market sentiment is seen to be affected by regional returns, unlike the countries' country sentiment did. For Denmark, this holds true after controlling for previous month local market sentiment. The coefficients are positive and significant at the 10 per cent level for both countries.

Results for Finland, however to a lesser statistical significance extent, follow on parallel terms as observed with country sentiment in the previous section: Higher past local stock returns have a positive impact on following period sentiment and vice versa. Previous month local returns show to have a positive impact on following period market sentiment levels in the Eurozone as well.

As was the case when analysing the relationship between different sentiment indices, previous month sentiment shows to have a strong impact on following month sentiment levels. And as before, for Norway and Finland, the influence of past market sentiment on future market sentiment is much lower than that of past country sentiment on following period country sentiment.

Overall, country- specific differences persist in the results. While past local returns hold significance for following period sentiment for Finland, regarding both country and market -sentiment, this cannot be said with regards to all the countries studied. For instance, Sweden showed no statistically significant results in either of the cases.

TABLE 9. Regression results, Equations 19-22, Local and Region -Market Sentiment and Local and Regional -Returns

Sentiment, Country	**Market Sentiment, Finland**						**Market Sentiment, Denmark**						**Market Sentiment, Sweden**					
Control	No			Yes			No			Yes			No			Yes		
Local market sentiment t-1 ($\beta_n S_{t-1}^{Local\ Market}$)																		
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$S_t^{Local\ Market} = a + \beta_1 R_{t-1}^{Local} + \varepsilon$	0.018**	0.008	0.015	0.017**	0.008	0.023	-0.017	0.017	0.000	0.008	0.015	0.268	-0.006	0.015	-0.005	0.006	0.013	0.280
$S_t^{Local\ Market} = a + \beta_1 R_{t-1}^{Local} + \beta_2 R_{t-1}^{Nordic} + \varepsilon$	0.014	0.041	-0.002	0.009	0.041	0.007	-0.058	0.041	0.002	-0.054	0.034	0.299	0.040	0.035	-0.005	0.037	0.033	0.123
	0.011	0.043		0.015	0.043		0.045	0.040		0.059*	0.033		-0.036	0.033		-0.030	0.031	
Number of Obs.	134 - 240						134 - 192						134 - 180					

Sentiment, Country	**Market Sentiment, Norway**						**Market Sentiment, Eurozone**					
Control	No			Yes			No			Yes		
Local market sentiment t-1 ($\beta_n S_{t-1}^{Local\ Market}$)												
Equation	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2	Coeff.	SE	R^2
$S_t^{Local\ Market} = a + \beta_1 R_{t-1}^{Local} + \varepsilon$	0.012	0.011	0.001	0.006	0.011	0.063	0.071***	0.016	0.130	0.032*	0.018	0.215
$S_t^{Local\ Market} = a + \beta_1 R_{t-1}^{Local} + \beta_2 R_{t-1}^{Nordic} + \varepsilon$	-0.047**	0.023	0.017	-0.050**	0.023	0.029						
	0.044*	0.025		0.044*	0.025							
Number of Obs.	134 - 240						134					

Significance codes:

0%	-	1%	***
1%	-	5%	**
5%	-	10%	*

* S_t^{Local}: Local sentiment index
* S_t^{BW}: Baker and Wurgler's (2006) sentiment index (orthogonalized version)
* $S_t^{x\ Country}$: Country sentiment index of x country
* $S_t^{x\ Market}$: Market sentiment index of x country
*The OMX Gross Indices (GI) consist of all shares listed on each of the exchanges.
*The OMX Nordic (EUR) Gross Index (Finland, Denmark, Sweden) is used as the "local" return index for the Eurozone.

5 CONCLUSIONS

This paper took a wide perspective on sentiment and its role in the Nordic stock markets; Finland, Denmark, Sweden, Norway and Iceland. The primary focus was to test whether sentiment affects Nordic stock returns. The definition of sentiment here was broad. The study examined not only the effect of local sentiment, but also explored avenues less researched in previous sentiment literature. These included examining cross border effects of sentiment to the extent of determining whether local and regional returns were affected by other than local sentiment, US and/ or regional sentiment to be more exact. In addition, local sentiment itself was analysed more profoundly. It was tested whether local and/ or regional -sentiment was affected by external, US and/ or regional -sentiment. Finally, the paper took a glance into the counter relation of sentiment and returns and tested whether past local and/ or regional returns affected following period sentiment.

So, does sentiment affect Nordic stock returns? Does US and/ or regional -sentiment affect local sentiment in the Nordic countries, and regional sentiment? Do local and regional -returns in the Nordic countries affect local and regional -sentiment? Perhaps, the questions posed at the beginning of this paper may be dignified by a formal response at this point. The short answer is yes. For all three.

Results provide evidence that sentiment does indeed affect aggregate Nordic stock market returns and thus support the primary hypothesis of the study. Further, the effect comes not only from the sentiment prevailing within national borders, but also from external sentiment; the sentiment which has proven to show dynamic capabilities in the form of "spilling" across borders. The strongest results are found for United States country and market -sentiment, which show to positively impact contemporaneous returns in the Nordic countries; When US country and/or market sentiment is high, contemporaneous returns tend to be relatively higher for the Nordic countries and vice versa. Denmark, Sweden and Norway also show sensitivity to local and/ or regional sentiment. The negative association implies that relatively higher returns are consequent to a period of low local and/ or Eurozone -sentiment in the previous month. Conversely, high sentiment in the previous month is expected to produce relatively lower returns in the following month as the market corrects itself.

Further, providing in favour of the second question and study hypothesis, local and regional -sentiment indices share positive exposure to external sentiment. For example, positive and highly significant coefficients are observed with regards to US market sentiment, for Finland, Norway and Eurozone; Finnish, Norwegian and Eurozone -market sentiment is positively influenced by higher prevailing (and preceding) levels of US market sentiment and vice versa.

Results also present support for the return- sentiment effect. For Finland previous month OMX- Helsinki returns are seen to positively influence following period sentiment, while for other countries past regional returns show to impact following period sentiment.

Overall results support the study hypotheses and provide the sought answers. However, they also lead to certain realizations and raise further questions. One such realization is that results show to vary greatly depending on the sentiment index used. There are several different measures for sentiment, as discussed in this paper, and different index have shown to diverge greatly from one another. For example, with regards to the three US sentiment indices used in this study, the indices shared only little if any resemblance with one another. The variation of results with regards to different sentiment indices emphasizes significance as to the choice of sentiment measures.

In addition, the results direct attention to the varying level of sensitivity of different countries to sentiment effects. If this same study was for example conducted separately for the different countries analysed, the conclusions, for some, would have been very different. For Iceland, for which a separate market- sentiment index was unavailable, factors explaining country- specific differences may lie within the relatively small size of the country, in terms of population and the stock market itself, leaving little room for a market sentiment to prevail and have any effect. For the other countries, reasons underlying the differences may be more complex, involving other country- specific, for example, cultural factors. As to further studies on investor sentiment, directing attention to country- specific factors might very likely be a course worth taking. By better understanding the constituents of sentiment in different countries, better proxies for sentiment may be constructed. Country- specific sentiment indices, in the construction of which the differences between countries have been acknowledged, might just reveal more about the effect of sentiment.

In the efficient market scenario, there seems no room for sentiment, it is deemed an exogenous short- lived phenomenon, one quickly ridded of by rational investors. However, perhaps a stronger presence has been established by this "phenomena" in the financial markets for longer, already before the efficient market theories themselves. A better understanding of sentiment, and its potential to affect financial markets, for example the stock market, as examined in this paper, may pave way for the development of more sophisticated models, able to generate better return forecasts. This in turn could provide better strategic aid for investment purposes. Sentiment is perhaps, rather than being a short- lived flaw caused by noise traders, more deeply rooted in the financial markets, being part of the nature of its participants, part of the markets' DNA itself. An occupant of permanent residence.

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