Short Selling: Domestic and Foreign Performance Differences - A study of the Swedish Short Selling Market

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Abstract

The purpose and intent of this study is to conduct comparative research between domestic and foreign investors in regard to short selling positions on the Swedish financial market. The performance differences are measured by compounding short selling positions by the investors between 2015-2018. Two comparative methods were utilized to conduct this research: The cumulative abnormal return (CAR) and the buy-and-hold abnormal return, with each calculation being utilized in accordance with Barber & Lyon (1997). The produced results have been scrutinized via univariate descriptive statistics (t-test) and a regression in order to verify if there is any significant difference between the investors.

The result of the study shows that there is a tangible, noteworthy difference in an average performance amongst the investors. We can now recognize that foreign investors who hold their short selling positions for a longer time-period demonstrate better performance. To compare with the domestic investors, their displayed trading behavior seems to be more unpredictable and they have not been performing as good in this selected time-interval.

Keywords: short selling, domestic and foreign investors, performance differences, performance variation, abnormal return, cumulative abnormal return (CAR), buy-and-hold abnormal return (BHAR), Swedish financial market.
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1. Introduction

1.1 Background

After the financial crisis in 2008, regulating authorities around the globe implemented more thorough regulations which have overhauled the financial industry, making it more prepared and less susceptible and vulnerable to future financial crises (Berger et al., 2015; Aragon et al., 2017). Even though the Security Exchange Commission (SEC) introduced legislations governing short selling as early as 2005, the United States (U.S.) authorities turned to extraordinary actions during the highs of the recent financial crisis, including banning short selling of various stocks (Diether et al., 2009). However, short selling has recently become a very common alternative investment strategy used mainly by institutional investors due to the sometimes-high related transaction costs, often excluding private investors (Boehmer et al., 2008; Diehter et al., 2009; Reed, 2013).

In comparison to conventional buy-and-hold stock trading, the concept of short selling can be considered to be more complicated. When conducting a short sell, the investor does not own the underlying asset and hence borrows it from someone who owns it for an interest rate. The asset is then sold with the prospect to be able to buy it back at a lower price in the future (Reed, 2013). The strategy of short selling has sparked moral discussions in regard to market manipulation as well as its utilized to speculate about economic downturns (Allen & Gale., 1992; Finnerty., 2005). The standpoints regarding liquidity-providing, market efficient and information have also been the subject of earlier research, where for example the short sellers are providing liquidity to the market participants (Diehter, 2009). Regardless of the intention, researchers have found evidence for that the level of short selling is largely corresponding to reporting periods (Christophe et al., 2004; Boehmer et al., 2008). Naturally, these findings lead to the question regarding information flows, and whether there is any information asymmetry among investors prior to the placement of the short positions. Kalev et al. (2008) found that, when investigating the Helsinki stock exchange (HEX), local investors seemed to have both short and long-term advantages on returns, compared to their foreign counterparties.
Therefore, it is of interest to see if there are corresponding differences on the Swedish financial market, which according to Kalev et al. (2008) could be due to information asymmetries or differences in skills between the domestic and foreign investors. In the long perspective, this could be harmful as it then might reflect that the market is persistent inefficient. Correspondingly, the research regarding the effects of short selling as an investment strategy is in general terms rather limited in Sweden.

The Swedish Financial Supervisory Authority (FI), responsible for overseeing the Swedish financial market, provides daily publications regarding the short selling activities. When investigating the publication regarding the stakeholders involved in short selling activities, it can be observed that most are of foreign origin. According to FI (2018), short selling must be reported if the short seller trades stock on a regular market platform such as the Stockholm Stock Exchange or any other marketplace within the European Union’s jurisdiction (coherent with the European short selling regulation, number 236/2012). This regulation is regarding all positions that exceeds 0.5% of the outstanding stocks, or if the price declines, making the position accounts for the same percentages. Hence, all major short selling trades are monitored and disclosed in order to increase the transparency within the financial market (FI, 2018).

1.1.2 Regulations - Financial Crises and Short Sell bans

In regard to short selling as an investment strategy, there have been long on-going discussions as to regulations. The first regulations for short selling were enacted over 400 years ago by the Amsterdam stock exchange and since then legislations has been of various degrees (Bris et al., 2007; Jain et al., 2013). Various scholars have debated whether if, short selling generates an increased market liquidity and enhance efficiency. This is regarding that short selling could stabilize overpriced stocks to a fair level in relation to the available information (Miller, 1977; Beber & Pagano, 2013). Contradictory to this, numerous researchers argue that short selling can create herding behavior among investors. Especially, in times of market volatility, when the available information could generate rumors and increase the irrational fluctuations on the market (Bikhchandani & Sharma, 2002).

Contemporary research regarding short selling highlights the regulatory changes of short selling after the recent 2008 financial crises (Jain et al., 2013; Beber & Pagano, 2013; Boehemer et al., 2013). During the financial crisis, 2008-2009 regulators started to ban short
selling as to mitigate the market fluctuations in the falling financial markets (Jain et al., 2013). In the U.S. the SEC banned short selling of approximately 1000 different stocks during the heights of the crises in September 2008. Boehmer et al. (2013) described bans on short selling as a desperate emergency order enacted by the government in order to stabilize the market conditions. The 2008´s ban of short selling lead to a 77% decline in short selling activities for large capitalization stocks within the U.S. financial markets. The decline that occurred after the ban inevitably leads us to think about the liaison between the liquidity drought after the financial crisis and short selling as a liquidity provider, mentioned by Beber & Pagano (2013).

Furthermore, Boehmer et al. (2013) grouped and summarized the short selling activities for 665 sample stocks during the 2008´s short selling ban period. The result showed that before the ban, 24.6% of all trades on the financial market were conducted as short selling trades and after the ban was ratified this share declined to account for 9.96% of all trades. During the ban period, investors could still use short selling to hedge investments and that is the reason for that the short selling activities never dropped till zero and completely seized to exist (Boehmer et al., 2013). The changes in the market, lead to the point that SEC in 2010 addressed the need of an updated and even more restricted version of the 1938´s uptick rule, which had then prevented investors from short selling exchange listed stocks if the price not recently had increased. This was due to the major changes over the last decades, with increased trading activity and volatility (Boehmer, et al., 2013).

The investor confidence also seemed to have decreased during the financial crisis (Schapiro, 2010). The SEC reviewed the uptick rule and to further tighten it, they named it the alternative uptick rule (Schapiro, 2010). The purpose of this new rule was implemented to maintain investor confidence and to increase the market efficiency and transparency. This new rule stated that when a security experiences a price decline of 10% or more in one day, a blocking tool will be enabled, preventing the investors to short sell the depreciated asset. This alternative uptick rule involves all stocks that are listed through the U.S. financial market (Schapiro, 2010). After the SEC implemented this type of regulations and demonstrated a way towards a more regulated financial market during 2008, other countries around the world followed by also legislating laws with the aims of stabilizing their financial markets (Beber & Pagano, 2013).
In November 2012 the European Union, after thorough market investigations, proceeded towards actions and enforced short selling regulations in line with the U.S. ones. Through the European Securities and Market Authority (ESMA) the council published a regulatory framework drawing new guidelines regarding short selling with the main aim of increased transparency and more thoroughly made disclosures (ESMA, 2012). The general objectives of this framework were to outline and reach common policies regarding disclosure standards amongst the EU member states. The intent was to be able to mitigate future financial crises better as well as to increase the financial stability and market confidence (ESMA, 2012).

1.2 Purpose

Ever since short selling was introduced 400 years ago with the short selling of the shares in the East India Company, the strategy has been subject to different regulations and blamed for various stock market declines (Bris et al., 2007), and there is no exception during the last financial crisis.

Contemporary research has been concentrating on the different mechanism related to short selling, with an imminently focus on short selling constraints and the effect it has on the market. Often with the standpoint in the pioneering classical works on the subject by Miller (1997) and Diamond & Verrecchia (1987). However, it exists limited amounts of research focusing on the performance of short sellers. As to investigate this, we will examine the differences in stock price returns after both domestic and foreign investors have taken on short positions in stocks on the Swedish financial market. This would provide valuable insights in whether domestic or foreign investors are performing differently.

As short sellers are aiming to take advantages of price discrepancies between the assets market value and the true value of the assets (Reed, 2013), the information is of considerable importance. For a short selling investor, the work is to investigate whether an asset is overvalued or not. It could be more difficult to gather such information in comparison to positive information, as public companies are reluctant to give out negative information when it is not mandatory (Healy & Palepu., 2001). Ferreira et al. (2017) investigated the differences between national and foreign institutional investors and found that they on average have the same performances but that the trading patterns for the national investors infer that they are better informed than their foreign counterparts.
The purpose of this thesis is to investigate whether it exists performance differences between domestic investors and foreign investors on the Swedish financial market. This, in order to amplify if there is any information asymmetry, which may be derived out of their origin. Earlier research has been made on the purposes of short selling, information asymmetry and on geographical proximity (Healy & Palepu, 2001; Jones & Lamont, 2002; Kalev et al., 2008; Baik et al., 2010; Massoud et al., 2010). The imminent part of the existing literature has shown tendencies of that domestic investors are displaying better performances compared to foreign investors (Kalev et al., 2008; Baik et al., 2010; Coval & Moskowitz, 2001). The subject we have chosen to investigate is whether these factors interfere with the short selling on the Swedish financial market. This is of academic interest as the functions regarding short selling has been widely discussed after the 2008’s financial crises and the market regulations have been made more thorough in order to increase the market transparency.

Kalev et al. (2008) investigated the nature of information asymmetry amongst investors. In their literature review, the authors suggest that information asymmetries can derive either from that domestic investors have fewer barriers to entry and have easier access to firm-specific information, in comparison to foreign investors. Contrary, foreign investors can possess superior investment skills which allow them to successfully invest abroad (Kalev et al., 2008). Although, as the concept of short selling is dependent on information, there is a difference of opinions in the current literature on how information affects the performance. We can identify that there is a lack of knowledge in the existing literature regarding if short selling performance is dependent on the investor's origin which could derive from information asymmetry, especially in the Swedish setting.

In this thesis, we are going to gather our data from the Swedish short selling publication provided by FI (2018), Nasdaq OMX Nordic and Thomson Reuters Eikon (DataStream). We are then going to separate the data based on the origin of the investors. Further, we will compare the stock development by estimating the abnormal return (AR), the buy-and-hold abnormal returns (BHAR) as well as the cumulative abnormal returns (CAR) following Barber & Lyon (1997) calculations.

In accordance with Kalev et al. (2008), this study will address the information asymmetry by evaluating the performance differences amongst domestic and foreign investors. Although
Kalev et al. (2008) amongst others (Baik et al., 2010; Coval & Moskowitz, 2001) have addressed this question, their research is raising interest for more research to be done on the subject. None of the identified studies are treating the subject regarding, the combination of short selling and information asymmetry. This thesis aims to contribute to the research gap regarding short selling, as this is of importance both academically as well as practically. This leads to the research question:

-Are there any significant performance differences in the underlying stock regarding if the short selling position is made by a domestic or a foreigner investor on the Swedish financial market?

1.3 Disposition

The study continues with section 2 and a literature review of the existing literature regarding short selling, information asymmetry and domestic and foreign investors. Section 3 presents the methodology in order to determine and measure the performance differences amongst the investors. Section 4 describes the data and the collection of it. Section 5 displays the results, and in section 6 the analysis of the dataset will be discussed and finally, section 7 will provide a conclusion.
2 Literature review

In the following chapter, the literature which will enact as a foundation for this thesis will be presented. Theories regarding information asymmetry, short selling constraints and the efficiency of the financial markets will be provided. The theories have been chosen to enlighten the reader on areas that have implications for short selling and the efficiency of the financial markets.

2.1 Information Asymmetry in Financial Markets

Kalev et al. (2008) investigated information asymmetry when comparing performance differences amongst domestic and foreign investors on the Finnish financial market. Whether the choice of local investments is rational rather than biased through information is questioned. For example, Coval and Moskowitz (2001) examined U.S. fund managers and found that their local investments compared to their other investments was yielding higher returns. Baik et al. (2010) used geographical proximity combined with stock trading returns in order to determine information asymmetry. The authors ultimately found that informed trading of local stocks provided higher returns.

Massoud et al. (2010) investigated short selling behaviors when hedge funds are involved in loan syndication. In their research, they found evidence that stocks usually declines in value after the company’s announcements, that they have turned to hedge funds for loans rather than commercial banks. Their study further showed that hedge funds are aware and take advantage of this, as they often short sell the equity of the firm before the amendment dates for the loans. Hence, their research has already amplified that short selling is subject to information asymmetry. Altogether, the literature has shown that there seem to be information asymmetries on the financial markets. Massoud et al. (2010) evidence of institutional short selling shows that there is an informational difference between hedge fund managers and other investors. In Baik et al. (2010) paper, the authors found that local institutional investors seem to have an information advantage over non-local investors while investigating the correlation between investor origin and the excess stock return. Further, Baik et al. (2010) research also display that local investors are more adaptable to reduce their stock holdings in advance to negative news.
Correspondingly to this research, an earlier study conducted by Cooper & Kaplanis (1991) investigated the implications of home biases in equity portfolios. The authors then found that equity portfolios in Sweden consist of 98% of domestic stocks, with corresponding results for other economies (i.e. UK – 82%, USA – 97%). Gehrig (1993) interprets those results as domestic investors are basing their investment decisions on the accessibility of information. And when investing locally, barriers such as language or culture do not interfere, making the investments less risky (Kalev et al., 2008).

2.2 Random Walk Hypothesis and Efficient Market Hypothesis

An important phenomenon that describes how available information affects the movements of a stock, is the concept called the random walk. This idea was developed by Kendall (1953) who attempted to explain and forecast the future value of a stock, arguing that all available information is reflected in the stock price. If the information on the market indicates that a stock is currently underpriced compared to its value. Investors will gather to buy that underpriced stock, and hence the price will adjust to its fundamental value. In other words, the stock price can only rise or fall when new available information enters the market. New information can then be considered as unpredictable information. That is information which occurred before the investors had the time to move towards the stock, unpredictable information leads to unpredictable fluctuations in the price. The random walk concept indicates that there are no natural patterns that follow the movement of stock prices and that the development in the price is independent of earlier movements (Bodie et al., 2014).

The random walk hypothesis helps to explain why the stock markets are ought to be efficient. Based on the available information, investors should be able to analyze and invest on previously shown behaviors. In a competitive market however, these behaviors do not seem to exist in the long-run. Therefore, for an investor to take advantage of earlier information and to analyze the movements. The investor must be aware of that the price of an asset is reflecting the current performance of the same asset. Regarding the performance, the inexplicit future expectations, as well as speculations about the stock, are embedded in the price (Bodie et al., 2014).

Naturally, analysts can interpret the information differently and thus there can be subjective disagreements about the future price. However, as the market is thought of being efficient, the
price of the security will always be floating around the true intrinsic value (Fama, 1995). Therefore, in relation to the random walk hypothesis stands the efficient market hypothesis (EMH). This hypothesis concept is that the financial market is consisting of informed, rational and value-maximizing individuals and all participants have access to the same information (Malkiel, 2003).

Further, for the market to be completely efficient, there cannot be any transaction costs. All investors should have the same possibilities to gather information and all the investors should be rationale and treat information in the same manners. The prices of the securities are reflecting previous information as well as new information (Fama, 1970; Malkiel, 2003). As all available information is mirrored in the market, arbitrageur possibilities should not exist.

2.3 Domestic and Foreign Investors

Within the last decade, institutional investors have tripled their investments on the global capital markets. In the publication regarding the short selling activity in Sweden, the list solely consists of institutional investors (FI, 2018). According to the international monetary fund (IMF), institutional investors managed above 45 trillion dollars during the heights of the 2008 financial crises (Ferreira & Matos, 2008). Previous research has examined the relationships between how and why both domestic and foreign institutional investors are investing and increasing their roles in corporate governance (Ferreira et al., 2008; Aggarwal et al., 2011). There is a lot of variance in the incentivization of investing in domestic and foreign stocks. Aggarwal (2011) argues, for example, that international institutions are often aiming to have a significant number of shares as an incentive for voting rights in the company. At the same time, this is the mean for developing business relationships with local companies. When utilizing their influence, investors tend to force companies to streamline the organizations they invest in. When doing this, they are increasing the value for the shareholders, by cutting the costs (Aggarwal et al., 2011).

Gillan & Starks (2003) also describes this occurrence, the authors argue that foreign institutional investors tend to use different control mechanisms to take on a more active role when investing internationally. This can, for example, be due monitoring of the management, developing business relations and exercising their voting rights (Gillan & Stark, 2003). This is explained by that this is a mean for the institutional investor to get information about the
acquired company, in order to decrease the information asymmetries between the entities. Another mechanism mentioned by Morck & Yeung (2005) is to force companies to pay dividends, this is because a well-managed firm should have sufficient funds to pay it. Also, Renneboog & Szilagyi (2014) argues that dividends are used as a complement to monitoring managers when mitigating the agency problems. Further, Gillan and Stark (2003) found a reason to argue that institutional investors who invest locally tend to take on a more defensive role. They argue that when investing locally, the institution is striving more to build relationships with the management and to encourage long-term perspectives rather than to interfere with the corporate governance (Gillian & Starks, 2003).

2.4 Short Selling Constraints, Lending Fees and Institutional Investors

Short selling is *per se* more complicated and involves higher transaction cost compared to conventional trading (Jones & Lamont, 2002; D’Avolio, 2002). The transaction costs usually derive from the lending of existing stocks of which are in the possession of another investor. Therefore, are the costs mostly made up by interest fees. What is also important is, if the underlying stock increases in value. The short selling position can be expensive to maintain, consequently, short selling is mainly conducted by institutional and sophisticated traders who can bear these costs, which otherwise can put the investor in debt (Reed, 2013).

The authors Jones & Lamont (2002) are discussing the limitations of short selling in regard to the fee of lending shares from an existing shareholder. According to the authors based on the supply and demand determinants of the stocks lendability. When an investor is this lending shares with the purpose of short selling, it could get problematic if the rightful owner demands the loan to be redeemed (Jones & Lamont, 2002). However, when the lendable supply of stocks decreases, the loan fee usually increases which subsequently is increasing the supply back to an equilibrium (Beneish et al., 2015). Meanwhile, there can be issues regarding the supply and demand amongst lenders and their counterparties. The legal and institutional issues are such as security and capital requirements in order for the investor to be allowed to short sell, this is referred to as short selling constraints (Jones & Lamont, 2002). These short selling constraints might result in a stock being overpriced, as the transaction cost for executing the short selling may exceed the possible excess return (Jones and Lamont, 2002).
Also, Drechsler and Drechsler (2014) recognized that it exists a short selling premium and that the largest stock price anomalies were when the company had high fees for equity lending. This notion might also correspond to earlier research by Bris et al. (2007), where the authors investigated the market skewness and market auto-correlation and found that the excess returns were smaller for Swedish stocks after the constraints regarding short selling constraints were lifted (Bris et al., 2007). Further, Jones & Lamont’s (2002) research showed that large-capitalization companies are being targeted for more short selling compared to smaller companies. This is due to that their stocks have a higher turnover rate and that they have more long-term oriented owners. When there is long-term ownership in a company, it tends to increase the supply of lendable stocks. This leads to a lower lending price and therefore it subsequently increases the amount of short selling activity. At the same time, Jones & Lamont’s (2002) research shows that stocks which are expensive to borrow have a relatively low return.

Alongside with these arguments regarding short selling constraints, Miller (1977) discusses, in one of the earliest and trend-setting works on the subject, the phenomenon to what the author refers to as; the divergence of opinions regarding the price of a stock. According to Miller (1977), when there is a wide dispersion of opinions regarding what a stock is worth. The conflicting views could result in a higher stock price, appreciating above the fundamental value of the stock. This is because uninformed investors are driving the price. At the same time, clusters of opinions consisting of informed investors can occur around stocks, lowering the stock’s value. This is because sophisticated investors (i.e. professional investors or financial institutions) identifies this overvaluation and cluster to take on short selling positions, lowering the stock price to its fundamental value.

In another classical work, conducted by Diamond and Verrecchia (1987), the authors are discussing that short selling constraints may help to regulate the true value of a stock and that one stock is never overpriced in regard to public information. However, Diamond and Verrecchia (1987) argue that rational but uninformed investors are aware of that short selling constraints, are one factor that can drive up the price of the stock. Therefore, if this is commonly known the stock price should already reflect its fair value.

Contradictory to Miller (1977), Diamond and Verrecchia (1987), more recent research have shown that that clustering of opinions can lead to changes in the stock prices. Bohl, Klein and
Siklos (2014) investigated short selling constraints and institutional investors. The authors found that it can occur what they call a herding effect when investors choose to imitate each other’s investment strategies. Also, Nagel (2005) discussed the phenomenon regarding institutional investors and short selling constraints. According to Nagel (2005), more sophisticated investors i.e. institutional investors often conducts profound analyses and forecasts in order to determine when a stock is over or undervalued. Nagel (2005) found that sophisticated investors were more prone to exercise short selling when a stock was overvalued. This in comparison to the average, often uninformed investor, who sometimes drove the stock’s value due to lack of knowledge (Nagel, 2005).

Earlier research conducted by D’Avolio (2002) also showed that institutional investors are more involved in short selling activities both on the lending side and on the exercising side. D’Avolio (2002) argues that stocks which have a large portion of institutional ownership are cheaper to lend. As the institutional investors are often having a long-term ownership in the stocks. Further, D’Avolio (2002) found evidence that the transaction costs of short selling are dependent on the variation of institutional ownership as the supply of lendable stocks will greatly increase with institutional ownership. When the ratio of institutional ownership is low, it will generate a lower supply of lendable stocks, increasing the transaction costs.

2.5 Summary and Hypothesis

In the literature regarding information asymmetry and the efficient market hypotheses, it suggests that the price of a stock should reflect all the available information. However, in the existing literature concerning domestic and foreign investors, has shown tendencies that it can be informational discrepancies amongst the investors. Scholars have debated that factors such as geographical proximity, language, and cultural differences can have implications on the access to information for the investors which in turn can affect their performances (Kalev et al., 2008; Baik et al., 2010; Coval & Moskowitz, 2001).

Considering short selling, research has amplified that it is more complicated compared to conventional trading. Studies about short selling constraints have argued that the constraints can influence the returns (Bris et al., 2007). Meanwhile, research has also shown tendencies of that when the level of constraints is increased, certain investor groups are excluded (Reed, 2013).
In line with Kalev et al. (2008), we will assess the performance of domestic and foreign investors. This in order to evaluate if there is an information asymmetry amongst the investors which can be shown in their performances as the investors are making their investment decisions in consideration of available information. We are going to compare the performances for a time interval of one to three months after the positions have been taken. Thereafter, the differences will be statistically tested in regard to the two performance measurements (CAR and BHAR) to draw empirical conclusions, this allows for the following hypotheses:

H1: *There is a performance difference when domestic investors are taking on short selling positions compared to foreign investors after one month.*

H2: *There is a performance difference when domestic investors are taking on short selling positions compared to foreign investors after two months.*

H3: *There is a performance difference when domestic investors are taking on short selling positions compared to foreign investors after three months.*
3 Methodology

This chapter will provide with the explanations and motivations of the methodology used in this study. The chosen research design will be scrutinized and the research process, as well as tools utilized for theory and data gathering, will be discussed. The reader will also be introduced to our techniques of gathering the processed material. Further, the methods of our analysis will be discussed, and our data sample will be investigated in order to answer the research question.

3.1 Estimations of Performance; Actual, Expected Return & Abnormal Return

In this study, the abnormal returns have been calculated in order to determine the performance differences between the domestic and foreign short selling investors. The starting point when conducting these calculations has followed the methods of cumulative abnormal return (CAR) and buy-and-hold abnormal return (BHAR) which are two ways of detecting abnormal returns. These two measurements have previously discussed by Barber & Lyon (1997), Barber et al. (1999) and Brown & Warner (1980) when they have investigated post-event return performances. However, in this study, we have used the calculations of abnormal returns to measure the performance differences between short selling positions made by domestic and foreign investors in a Swedish context.

Previous literature that have investigated the differences amongst investors and information asymmetry have mainly been focused on absolute and cumulative returns when determining who is performing the best (Kalev et al., 2008). In the study, the approach of Kalev (2008) has been slightly altered to comprehend abnormal returns. This has been made in order to intercept the expected return and the difference between the actual return, as this has been argued to symbolize the realized idiosyncratic return for an investment which is due to the investor's ability to invest successfully (Chambers et al., 2013). Which then derives from the investor's ability to make informed decisions. Further, when measuring the abnormal returns, a representative index is taken into consideration to compare with.

The short selling activities monitored by FI does not include any exit dates for the positions, we had to standardize the time of the positions to be able to compare them. Akbas et al. (2017) argue that there are different opinions regarding the average length of the average
short selling position, the authors argue that a short selling position can range from a couple of days to several months. The selected time-horizon in this study is in accordance with Akbas et al. (2017) thoughts that the length of the positions can vary a lot. To be able to adjust for the time-range regardless of when the short selling position was taken, we have adjusted the time horizon by estimating the actual, expected and abnormal returns for each of the positions after +1, +2 and +3 months. The purpose of this approach was to be able to make a comparison and to illustrate the average performance differences amongst the two investor groups.

The first steps, when wanting to calculate the CAR and BHAR is to estimate the input variables actual and expected return.

Firstly, we conducted the estimations of the actual return and the expected return. To estimate the actual returns for the positions, the stock returns were calculated from the starting date of when the short selling positions were taken to the actual returns after +1, +2 and +3 months. The formula is constructed as follows:

\[ R_{i,t} = \frac{(P_{i,t} - P_{i,t-1})}{P_{i,t-1}} \] (1)

Where \( R_{i,t} \) is the actual return in a sample firm after a specific time interval. \( P_{i,t} \) is the price of a chosen stock on a specific date in the future. \( P_{i,t-1} \) is the price of the same stock on the positions starting date.

Further, when estimating the expected return, we used the Capital Asset Pricing Model (CAPM) introduced by Sharpe et al. (1964). This is a commonly used model for calculating the expected return for a portfolio or a sample stock. The CAPM-model shows and measures the relationship between the expected return and risk (Fama & French, 2004; Chambers et al., 2013). The CAPM-model specifies the expected return of a specific stock in the following way:

\[ E(R_i) = R_f + \beta_i [E(R_m) - R_f] \] (2)
Where the $E(R_i)$ is the expected return of a stock. $R_f$ is the risk-free rate. $\beta_i$ is the Beta of the stock, which is the proportion by which the stock is moving in parallel to the market. $E(R_{m})$ is the expected return of a market portfolio (representative market index).

When the returns were estimated, the input variables were calculated separately for each position, the positions were equalized considering the positions timing and regarding how the market was performing. When the expected returns for the positions were calculated, the used index representing the market performance was the Nasdaq OMX Stockholm Performance index (OMXSPI). This index is suitable because it includes all publicity listed stock on the Stockholm stock exchange, including the sample firms (Avanza, 2018). Lastly, when the risk-free rate was determined, we presupposed Damodarian’s (2008) research. Damodarian (2008) argues that the requirements for the risk-free rate are that there cannot be any default risk and there cannot be any reinvestment risk considering the investment. In this study, the risk-free rate was set to 2.9%. This number is in accordance with PwC’s yearly market valuation paper, which is a well-known paper that aims to investigate and estimate the risk-free rate in Sweden through market analysis (PwC, 2017).

When estimating the abnormal returns for the positions, the calculations for which Barber & Lyon argues (1997) were used. In their research, they are suggesting an adjusted estimation where the abnormal return is calculated as the difference between the actual return and the expected return. The estimation of the abnormal return (AR) which Barber & Lyon (1997) argues for defined as follows:

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

Where $AR_{i,t}$ is the abnormal return of one sample stock given a specific time range. $R_{i,t}$ is explained by the actual return of the sample stock $i$, within the time interval of $t$. $E(R_{i,t})$ is the expected return (Barber & Lyon, 1997).
3.2 Estimations for Short Selling Performance Differences

The two calculations that have been used, are commonly used when determining the abnormal returns. The CAR can be explained by adding all the sums of the abnormal returns through a specific given time interval. It is defined in the formula as follows (Barber & Lyon, 1997);

\[
CAR_{i,t} = \sum_{t=1}^{T} (R_{i,t} - E[R_{i,t}]) = \sum_{t=1}^{T} AR_{i,t}
\]  

(4)

The \(CAR_{i,t}\) is the aggregated abnormal return for a specific stock given the specific time-period \((t)\). \(R_{i,t}\) is the actual return of the sample stock at a specific time \(t\) and \(E[R_{i,t}]\) is the expected return of the sample stock at \(t\) period.

The comparative measurement, the BHAR is constructed as follows (Barber & Lyon, 1997);

\[
BHAR_{i,t} = \prod_{t=1}^{T} [1 + R_{i,t}] \cdot \prod_{t=1}^{T} [1 + E(R_{i,t})]
\]  

(5)

Where, \(BHAR_{i,t}\) is the buy-and-hold abnormal return of a sample firm for a specific time-period \((t)\). \(R_{o}\) is the actual return of the stock given the specific time-period \((t)\). \(E[R_{i,t}]\) is the expected return of the sample stock at \(t\) period.

Through a short time-horizon, the two measurements are both very similar. Both measurements are calculating the abnormal return in relation to the actual return and the expected return (Barber & Lyon, 1997). The difference, however, is that CAR disregards the compounding effects and the BHAR is including this effect. This implies that if the stock return is more volatile than the returns for the reference index, the CAR will show a higher result compared to the BHAR if it is less or equal to zero (Barber & Lyon, 1997). Another difference is that the CAR is the arithmetic value of sums whilst the BHAR is the geometric value (Barber & Lyon, 1997). The two measurements have both been discussed and Barber et al. (1999) argue that the BHAR is better, when wanting to see if a stock is yielding returns over a given period of time, while the CAR is better to see constant abnormal returns.
3.3 Descriptive Statistics

3.3.1 T-test

To see whether the results that had been produced were significant, linear regression was primarily. This in order to see whether there was any statistical correlation between the variables for performance differences. However, the three hypotheses were also tested via unpaired t-tests. The unpaired t-tests were conducted because that the number of positions taken on by the investors was so different. Within the selected time interval, 94% of all short selling positions were conducted by foreign investors (FI, 2018). Because of this imbalance between the two sample groups, there can be systematic flaws which cannot be disregarded. When performing the t-tests, we first pooled the investors into two groups consisting of domestic and foreign. Secondly, the means for all positions were measured. Third, we performed six t-tests considering CAR +1 month, +2 month and +3 month as well as BHAR +1 month, +2 month and +3 month. This was made in order to see whether there was any statistical correlation for either of the months and in either of the abnormal return measurements. This means, that the result displays if the distribution of the average CAR and the average BHAR are following the Student t-distribution and are thereby dependent on each other. This implies, that if any of the data is not significant, the size of the sample might be too small to statistically validate it.

The tests are constructed as follows;

\[ t_{\text{CAR}} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1-1)\sigma_1^2 + (n_2-1)\sigma_2^2}{(n_1-1) + (n_2-1)}} \left( \frac{1}{n_1} + \frac{1}{n_2} \right)} \]  

(6)

and

\[ t_{\text{BHAR}} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1-1)\sigma_1^2 + (n_2-1)\sigma_2^2}{(n_1-1) + (n_2-1)}} \left( \frac{1}{n_1} + \frac{1}{n_2} \right)} \]  

(7)

Where the \( \bar{X}_1 \) and \( \bar{X}_2 \) are the average short selling performances for the sampled positions and the \( \sigma_1 \) and \( \sigma_2 \) are the standard deviations of the estimated returns and \( \sqrt{n} \) is the square root of the number of short selling positions that have been taken by domestic and foreign investors.
When testing the hypotheses, the hypotheses cannot be disregarded if we can prove statistical correlation. Although, if we do not find any evidence for our hypotheses, we cannot consider them reliable. When determining if any hypotheses could be ignored, a 5% significant level is common to use. If the t-value falls into the critical area, which is 95% of the confidence interval, then we cannot assume that there is a significant difference.

3.4 Regression

In order to properly answer our research question whether the domestic or foreign short selling investors exhibit any significant average performance differences, two regressions have been made. One for CAR and one for BHAR, consisting all of the positions, considering all stocks. The average CAR and the average BHAR were pooled together considering the months but separated by the origin of the investors. The regressions have determined if the domestic investors are performing better compared to the foreign investors on average through the time interval +1 month, +2 month and +3 month. The regression functions are stated in the following way;

\[
CAR = \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \epsilon \quad (8)
\]

and

\[
BHAR = \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \epsilon \quad (9)
\]

Where \( \alpha \) is the average CAR and BHAR performance for the foreign investors after the first month and \( \alpha + \beta_1 \) is the average CAR and BHAR performance for the foreign investors the second month. Thus, the \( \alpha + \beta_2 \) is the average CAR and BHAR performance for the foreign investors after the third month and \( \alpha + \beta_3 \) is the average CAR and BHAR performance for the domestic investors after the first month. Further, \( \alpha + \beta_1 + \beta_3 \) is the average CAR and BHAR performance for the domestic investors after the second month. Consequently, \( \alpha + \beta_2 + \beta_3 \) is the average CAR and BHAR performance after the third month. The \( \epsilon \) is the error term.

Hence, to avoid a dummy variable trap, i.e. to avoid multicollinearity, the first month was omitted from the model. The coefficient \( \alpha \) will capture the effect of the first month after the short selling occurred. \( D_1 \) will take the value 1 if it is the second month after short selling occurred and 0 otherwise, \( D_2 \) will take the value 1 if it is the third month after the short selling
occurred and 0 otherwise and $D_3$ will take the value 1 if the investor is domestic and the value 0 if the investor is foreign.

What is important to emphasize in this regression function is that we did not adjust for the error term in order to avoid serial-correlation which then could have indicated that the significant results may not be significant when adjusted for the standard error term.
4 Data

This section will provide the reader with a description of the data that have been chosen for this thesis. The following part will discuss and evaluate the collection of data and the method that has been used in line with the quantitative nature of this study. Lastly, limitations and general assumptions will be discussed and put in an empirical setting.

4.1 Data Collection

Most of the literature and data in this thesis is perceived as secondary data, such as scientific articles, governmental publications. Primary sources of information are FI, Nasdaq OMX Nordic and Thomson Reuters financial database Eikon (DataStream). These sources are to be considered reliable, as they are from regarded institutions. The collected data regarding the short selling activities is from the short selling publication published by FI. The short selling data includes companies from large, middle and small capitalization on the Stockholm Stock Exchange. The data is structured and published with the following information; publishing date (when the position is published on the list), position holder (company that takes the position), name of the issuer (company in which the position has been taken), ISIN-number (International Security Identification Number), position date (date when the position is taken), short interest (size of the position) and other comments. Other comments are referring to correction of errors, i.e. if a position has been falsely published. The time interval that has been selected for this study is regarding the short selling positions through the interval of 2015-01-02 to 2018-03-19.

4.2 Method for data collection

When retrieving and sorting the underlying historical stock prices and market indices (i.e. OMX Stockholm PI), the Thomson Reuters financial database Eikon (DataStream) has been used. We also gathered data from Nasdaq OMX Nordic for the sample, this data was more extensive and included all the communication the companies have had with the market (i.e. earning announcements, stock splits, and share issues). The selected representative market index is the OMXSPI. This is an index that includes all the publicly listed companies on the Stockholm Stock Exchange and can be considered as both truthful and suitable to act as a reference index in this thesis. Also, the gathered stock prices from these two databases, have been compared in order to validate that we are basing the calculations on reliable numbers.
In the data from FI (2018), we identified 233 stocks in which there were short selling activities. In this sample, we identified four companies where it was both domestic and foreign investors involved in the short selling activities. In these four companies, 587 short selling positions were identified. These positions were taken by 35 different investors. As FI is the only source of short selling activities on the Swedish financial market, the list has been reviewed several times. This, in order to see that no corrections have been made for the positions during the time of the work (i.e. “other comments” on the list).

In this way, the authors have not specifically selected the sample firms. All the sample firms are publicly listed on the Stockholm Stock Exchange. However, all the firms are within different industries and sectors. Avanza Bank Holding (large capitalization) is a Swedish internet bank focused on private savings and investments, Betsson B (large capitalization) is multinational online gambling company, Fingerprint Cards AB (large capitalization) is a technological company, which is offering a broad range of biometric solutions and Gränges (middle capitalization) is a company within the aluminum industry and is producing, processing and selling metal. Underneath in Table 2 is a description of the sample firms displayed considering all the short selling positions during the time interval, separated by domestic and foreign investors;

<table>
<thead>
<tr>
<th>Sample Stock</th>
<th>Total Number of Short Selling Positions</th>
<th>Domestic Investor Positions</th>
<th>Foreign Investor Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avanza Bank Holding</td>
<td>14</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Betsson B</td>
<td>96</td>
<td>18</td>
<td>78</td>
</tr>
<tr>
<td>Fingerprint Cards B</td>
<td>437</td>
<td>3</td>
<td>434</td>
</tr>
<tr>
<td>Gränges</td>
<td>40</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>587</td>
<td>33</td>
<td>554</td>
</tr>
</tbody>
</table>

The sample period for the study has been set to a three-year interval between 2015 and 2018. This is due to that this time-range has been relatively stable (no major financial disruptions) and it is consistent with today’s market. We have also considered that there is no known work on comparing short selling activities within this time frame.
4.3 Limitation of data

The data regarding short selling provided by FI does not include any exit dates nor durations for the positions. This data is not available and can therefore not be included or assumed. Neither does the data include all short selling. It does only provide us with the information regarding positions that exceed 0.5 percent of the outstanding stocks and it does not include transactions on the shadow markets. The data period could be extended, but the authors believe that the chosen data reflects today's activities on the market.

Another aspect regarding the data is that there are only four stocks in which both domestic and foreign investors have taken short selling positions in within the selected time-frame. However, we are still able to generate significant results due to the large number of positions in these four stocks, when comparing the performances. Each position is subject to three months of calculations, which corresponds to 1761 observations. Although, an increased dataset might provide an even deeper understanding of the performance differences.

4.4 Reliability & Validity

In order to provide an as objective approach as possible, the data-inputs, face-validity as well as the inter-rater reliability have been examined.

The face-validity refers to the content of the study if the collected data enables us to answer the research question which the thesis aims to do. Another important part is if it is replicable (Bryman & Bell, 2011). In order to fulfill the face-validity and the replicability, the authors have tried to describe the motivations behind and the modus operandi for all the data gathering and calculations. With the same type of data available from FI (2018), this study should be replicable. The validity is often divided into subparts, one of the subparts is concurrent validity. This infers to if the study could be conducted via another technique or other criterions and still receive the same result (Bryman & Bell, 2011). In this thesis, the criterion validity will be addressed, when comparing the result of this study with other papers, investigating the differences in stock returns amongst investors. Another subpart is the internal validity, internal validity refers to the causality relations (Bryman & Bell, 2011). In this study, the aim was to investigate whether there are any performance differences between the investors based on their origin as this can be an indication of information asymmetry, argued by Kalev et al. (2008).
In order to confirm that the criterion validity is fulfilled, it is important to assure that the estimations regarding the statistical correlations of performance differences amongst domestic and foreign investors are the right ones. The calculations in this study were constructed to measure the average performance differences through a period of +1, +2 and +3 months. The regression models were not constructed to control for either how often investors are taking on short selling positions nor if the investors’ prerequisites have any impact on the results (i.e. knowledge and earlier short selling experiences). If measuring these types of causalities, the result would be more accurate. However, such causalities are hard to measure and must be disregarded.

Although, in a more complete study, more variables could have been considered to extend the regression but also to use a more advanced econometric procedure could have been utilized. The time-frame could also have been extended historically to include all positions since the publication by FI started.

The reliability is the measurement of truthfulness regarding how a research paper is conducted (Bryman & Bell, 2011). To make this thesis as reliable as possible, all the calculations and steps when assessing the performance have been thoroughly described and all the steps in the calculations have been double checked by both of the authors to prevent that any human errors could have occurred. The methodology regarding the performance measurements has also been thoroughly discussed with our supervisors.
5 Results

In this section, the results originating from the calculations described in the method are going to be presented. First, the assessed performances are going to be statistically verified by applying descriptive statistics. Subsequently, the empirical result is going to be presented with regression analysis.

5.1 Descriptive Statistics

In this study, the total amount of short selling positions accounts to 587 with a clear majority of foreigner as the position owners. Since this study is focused on the positions per se and not the dates on which short selling is conducted, an unpaired sampled t-test is chosen. This test is chosen as it is frequently used when determining differences between populations. According to Wahlin (2011), the author argues that, when there are more than 30 observations in each sample, the sample deviation should be seen as if it follows the rule of a normal distribution when the populations are independent. However, as the short selling positions are taken on in the same companies, it could be argued that they would not be considered to be completely independent.

Table 2 - Unpaired sample t-test distribution of domestic and foreign CAR and month.

<table>
<thead>
<tr>
<th>Variable: CAR</th>
<th>Observations</th>
<th>Average performance</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR Foreign +1 Month</td>
<td>554</td>
<td>-0.027</td>
<td>0.162</td>
</tr>
<tr>
<td>CAR Foreign +2 Month</td>
<td>554</td>
<td>-0.108</td>
<td>0.405</td>
</tr>
<tr>
<td>CAR Foreign +3 Month</td>
<td>554</td>
<td>-0.245</td>
<td>0.709</td>
</tr>
<tr>
<td>CAR Domestic +1 Month</td>
<td>33</td>
<td>0.002</td>
<td>0.084</td>
</tr>
<tr>
<td>CAR Domestic +2 Month</td>
<td>33</td>
<td>-0.008</td>
<td>0.171</td>
</tr>
<tr>
<td>CAR Domestic +3 Month</td>
<td>33</td>
<td>0.001</td>
<td>0.270</td>
</tr>
</tbody>
</table>

Table 3 - Unpaired sample t-test distribution of domestic and foreign BHAR and month

<table>
<thead>
<tr>
<th>Variable: BHAR</th>
<th>Observations</th>
<th>Average performance</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHAR Foreign +1 Month</td>
<td>554</td>
<td>-0.027</td>
<td>0.162</td>
</tr>
<tr>
<td>BHAR Foreign +2 Month</td>
<td>554</td>
<td>0.162</td>
<td>0.446</td>
</tr>
<tr>
<td>BHAR Foreign +3 Month</td>
<td>554</td>
<td>0.026</td>
<td>0.896</td>
</tr>
<tr>
<td>BHAR Domestic +1 Month</td>
<td>33</td>
<td>0.002</td>
<td>0.084</td>
</tr>
<tr>
<td>BHAR Domestic +2 Month</td>
<td>33</td>
<td>-0.003</td>
<td>0.175</td>
</tr>
<tr>
<td>BHAR Domestic +3 Month</td>
<td>33</td>
<td>0.019</td>
<td>0.298</td>
</tr>
</tbody>
</table>
Initially, we separated the two investor groups with consideration to their total amount of short selling positions. Thereafter, they were separated in regard to CAR ad BHAR. In order to calculate the unpaired t-test, the mean and standard deviation was measured per position and for all of the positions included per month. This has been done to enable for the investigation of the correlation between the investors’ performances per month for all of the positions.

In Table 2, displaying the average CAR performance it displays that the average CAR for all the foreign positions calculated +1, +2 and +3 months exhibits negative values. The domestic investors only seem to achieve a negative average regarding +2 months. Considering the standard deviation, the values are higher in all months after the foreign investors have taken on positions in regard to the time after the domestic investors. This implies that the underlying stocks have been more volatile through the observed time after the foreigners have entered their positions. The tendencies show that the foreign investors are performing better on average in regard to CAR. In Table 3, displaying the average BHAR performance, the performances are slightly different. For BHAR Foreign +1 month and BHAR Domestic +2 month, the results are negative. Although, the measured standard deviations for the domestic and foreign BHAR are showing the same tendencies, as for the domestic and foreign CAR measurements.

However, in order to see whether these performance differences for the CAR and BHAR are statistically significant in regard to the standard deviation and variance between the samples assessed results. The t-tests were carried through.

For these t-tests, the testable significances are 1/5/10 %. In this sample, the degrees of freedoms accounts to 585, which is a fairly large sample and therefore implies that the Z-distribution for normal distribution can be used. This means that the thresholds values are in the interval of -2.57/-1.96/-1.64 and 1.64/1.96/2.57 in the normal distribution curve. In order for the results to be significant, the calculated values must either shorten the threshold of -2.57/-1.96/-1.64 or extend the threshold of 1.64/1.96/2.57. The results from the six calculated t-tests are displayed in Table 4.
Table 4 - Observation of correlation in CAR and BHAR between domestic and foreign investors

<table>
<thead>
<tr>
<th>Observations for the correlation in CAR &amp; BHAR</th>
<th>T-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR +1 Month</td>
<td>1.010</td>
</tr>
<tr>
<td>CAR +2 Month</td>
<td>1.398</td>
</tr>
<tr>
<td>CAR +3 Month</td>
<td>1.989**</td>
</tr>
<tr>
<td>BHAR +1 Month</td>
<td>1.009</td>
</tr>
<tr>
<td>BHAR +2 Month</td>
<td>-2.121**</td>
</tr>
<tr>
<td>BHAR +3 Month</td>
<td>-0.0451</td>
</tr>
</tbody>
</table>

*/**/*** denotes the significance at the 10%/5%/1% level

As displayed in Table 4, all the values except CAR +3 Month and BHAR +2 Month fall into the critical area between the thresholds. This implies that there are no statistically significant performance differences between the CAR +1, +2 and BHAR +1, +3. Regarding the CAR +3 Month and the BHAR +2 Month, the t-values fall in the tails of the normal distribution curve. This implies that there is a statistical difference between the domestic and foreign performances considering the standard deviation and variance between the investors. As for the hypotheses, the hypothesis H2 and H3 when considering CAR +3 Month and BHAR +2 Month cannot be disregarded, when testing it on a confidence level of 95%.

5.2 Regression Analysis

By applying the two regressions we are examining the average performance differences amongst the domestic and foreign investors. While studying the CAR and BHAR values for all the short selling positions throughout the interval of +1, +2 and +3 months. The observations account to 1761, in other words, 587 per month, multiplied by 3 months. Table 5 underneath displays the outcome of the CAR regression;

Table 5 - Regression analysis CAR

<table>
<thead>
<tr>
<th>Number of obs.</th>
<th>R-squared</th>
<th>Adj R-squared</th>
<th>P-value for F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1761</td>
<td>0.035</td>
<td>0.033</td>
<td>1.218E-13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coef.</th>
<th>Std.error</th>
<th>t-value</th>
<th>Significance level at</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. CAR Foreign 1 month</td>
<td>-0.032</td>
<td>0.019</td>
<td>-1.647</td>
</tr>
<tr>
<td>Avg. CAR Foreign 2 month</td>
<td>-0.076</td>
<td>0.027</td>
<td>-2.788</td>
</tr>
<tr>
<td>Avg. CAR Foreign 3 month</td>
<td>-0.207</td>
<td>0.027</td>
<td>-7.544</td>
</tr>
<tr>
<td>Avg. CAR Domestic</td>
<td>0.119</td>
<td>0.048</td>
<td>2.451</td>
</tr>
</tbody>
</table>
When measuring the reliability of the regression function in regard to the average performance of CAR. The R-square is explanatory term regarding how much of the variation in the dependent variable that can be explained by the independent variables (Campbell, 1997). Approximately, 3.3% of the variation in CAR can be explained by, when an investor chooses to take on a short selling position (the independent variables). This indicates that there exists a statistical link between these coefficients. Further, by studying the significance of the regression model for CAR, the P value for F (1.218E-13) is far below the confidence interval 90%, 95% 99%. Therefore, this model can be considered to be statistically significant. Furthermore, when investigating whether the coefficients in the function are statistically significant, we found that they are all significant ranging in the intervals between 10-1%, which is shown in Table 5 above.

We can observe a slightly different result in the regression regarding the BHAR. The result is displayed in Table 6 below;

<table>
<thead>
<tr>
<th>Number of obs.</th>
<th>R-squared</th>
<th>Adj R-squared</th>
<th>P-value for F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1761</td>
<td>0.003</td>
<td>0.002</td>
<td>0.114</td>
</tr>
<tr>
<td></td>
<td>Coef.</td>
<td>Std.error</td>
<td>t-value</td>
</tr>
<tr>
<td>Avg. BHAR Foreign 1 month</td>
<td>-0.029</td>
<td>0.024</td>
<td>-1.246</td>
</tr>
<tr>
<td>Avg. BHAR Foreign 2 month</td>
<td>-0.044</td>
<td>0.033</td>
<td>-1.330</td>
</tr>
<tr>
<td>Avg. BHAR Foreign 3 month</td>
<td>-0.069</td>
<td>0.033</td>
<td>-2.073</td>
</tr>
<tr>
<td>Avg. BHAR Domestic</td>
<td>0.073</td>
<td>0.059</td>
<td>1.244</td>
</tr>
</tbody>
</table>

The explanatory term R-squared for BHAR (0.003) is displaying a lesser value compared to R-square for CAR (0.033). The variation for this regression can, therefore, be questioned. This is also corresponding to the BHAR model which does not exhibit a statistically significant P-value for F (0.114). Further, when examining if the variable has any statistical effect on the BHAR, the 3 month is significant regarding the confidence interval of 95%. For the other coefficients, we cannot statistically verify that a change in the coefficient variable is dependent on how the domestic and foreign investors are performing on average over time.
5.3 Performance differences – Regression analysis

Table 7 below, displays the average performance differences amongst the two investor groups.

<table>
<thead>
<tr>
<th>Avg. Performance Differences</th>
<th>CAR</th>
<th>BHAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Investors +1</td>
<td>-0.032</td>
<td>-0.029</td>
</tr>
<tr>
<td>Foreign Investors +2</td>
<td>-0.108</td>
<td>-0.074</td>
</tr>
<tr>
<td>Foreign Investors +3</td>
<td>-0.239</td>
<td>-0.098</td>
</tr>
<tr>
<td>Domestic Investors +1</td>
<td>0.087</td>
<td>0.043</td>
</tr>
<tr>
<td>Domestic Investors +2</td>
<td>0.011</td>
<td>-0.001</td>
</tr>
<tr>
<td>Domestic Investors +3</td>
<td>-0.119</td>
<td>-0.025</td>
</tr>
</tbody>
</table>

The aim of this study is to display whether there are any performance differences amongst the investors, with the expectation that domestics investors are outperforming the foreign ones when conducting short selling, based on information asymmetry.

The regression models are showing how the two investor groups are generally performing over time. The results from the two regression models are showing different results. Regarding the domestic investor both the CAR and BHAR are showing irregular patterns. In comparison with the foreign investors, we can distinguish regular patterns for both CAR and BHAR, which inclines that the longer a foreign investor on average maintain the short selling position, the greater average return both in terms of CAR and BHAR the investment will yield.

Statistically, we can confirm that a change in the coefficient for CAR will result in a better average performance for the foreign investor compared to the domestic investor, this change is consistent through the three months. In comparison with the BHAR regression, the only significant coefficient at a confidence interval of 95% is the “Avg. BHAR Foreign 3 month”. Meanwhile, the regression function regarding the BHAR is not statistically significant, considering the P-value for F which is 0.114. This can be compared with the P-value for F estimating to 1.28E-13 regarding the CAR. Another difference between the two regressions is the R-squared factor, this is significantly lower for BHAR than for CAR. These results show that the regression considering CAR implies a stronger statistical relationship compared to the BHAR regression.
6 Analysis

In this section, we will analyze the empirical result from the performance calculations. Based on the results, we are going to discuss the outcome and address distinguishable trends and the connections to previous literature.

6.1 Performance Differences

In this thesis, the performance differences between domestic and foreign investors were examined considering CAR and BHAR. When testing the hypotheses via the t-tests, a statistical correlation in the performance measurement regarding CAR +3 month and BHAR +2 month was found. This implies that there is a statistical difference amongst the investors and that the hypotheses 2 and 3 cannot be disregarded. However, the t-tests are only showing that there are statistical differences in the tests, but we cannot determine how these differences are influencing the result. Which means that from the t-tests we cannot say who is performing the best.

A multitude amongst researchers (Baik et al., 2010; Coval & Moskowitz, 2001; Kalev et al., 2008), have examined the performance differences for heterogeneous groups of investors. These researchers have found various evidence for, that local investors have a short-term and sometimes even long-term advantages compared to foreign investors. In order to see how the differences are showing themselves in the returns amongst the short selling investors on the Swedish financial market, we applied regression analysis to our observed results.

The results from the regressions indicate that the differences in the average CAR and BHAR are showing similar tendencies for the foreign investors over the three months’ time horizon. Through all months, both measurements are showing negative returns achieved by the foreign investors. The inclinations are displaying that, the longer a foreign investor is maintaining their short selling positions, the greater returns their positions will likely yield. In comparison to the tendencies regarding the domestic investors, their performances seem to be more irregular through the three months. On average, the domestic investors have not been performing as good as the foreign ones. However, in the CAR regression, all the coefficients are significant in comparison to the coefficients for the BHAR regression, which is only
showing significant results for the average performance regarding +3 months. This means that the CAR regression is more reliable than the BHAR regression (see Table 5, 6, 7).

This is contradictory to previous literature. Kalev et al. (2008) argued that domestic investors are performing better than foreign investors while investigating the Finnish financial market. The authors then argued that this is because the investors are basing their investment decision upon the availability of information and domestic investors are having easier access to company-specific information which derives from barriers regarding distance, language and culture (Kalev et al., 2008). Also, Baik et al. (2010) investigated stock market returns combined with geographical proximity. The authors found that informed trading of local stocks generated higher returns compared to non-local stocks and also that local investors should be able to be better at foreseeing stock declines on their local market.

In our results, the uneven patterns for the average returns yielded by the domestic investors could indicate that the short selling is biased by the individual investor behind the position. Nagel (2005) argues that institutional investors are more prone of conducting their own thorough analysis before taking on investment decisions in comparison to individual investors. Our results indicate that there might also be a difference amongst the institutional investors considering their abilities to conduct accurate analysis.

Opposing Kalev et al. (2008) and Baik et al. (2010) studies, Ferreira et al. (2017) investigated the relationship between national and foreign institutional investors. The authors found tendencies for that regardless of the origin, the investors exhibit the same average performance. However, the nationals’ trading patterns inferred that they were better informed compared to their international counterparties (Ferreira et al., 2017). Although, this is not consistent with our sample.

Aggarwal et al. (2011) and Gillan & Starks (2003) describes that foreign institutional investors take on a more active role when investing abroad and that they are acting more defensive when investing on their local market. This in order to decrease possible information asymmetries that might exist and to increase the value of their investments. However, this might not correspond to the notion of short selling, as the investors want the stock price to depreciate. Although this might infer that foreign investors take more reasoned investment decisions when investing abroad.
Due to the identified tendencies in the results of the regression models, we can assume that the efficient market hypothesis (EMH) can be questioned and further scrutinized with good reason. In accordance with our results which shows that arbitrageur possibilities might exist, with respect to the average performance differences between the domestic and foreign investors.

According to, Beber & Pagano (2013) short selling could stabilize overvalued stocks. This could then be a possible explanation of the arbitrageur opportunities. However, this might also be explained by the divergence of opinions described in the classical work of Miller (1977). Miller (1977) argues that the subjective judgment of all investors can drive the price of a stock. In accordance with the random walk hypothesis, which implies that the stock price is floating around its fundamental value due to the subjective processing of information conducted by the investors (Bodie et al., 2014). This might be one possible reason for why not all the statistical tests are of significant value and that all hypotheses can be confirmed.
7 Conclusion

Most research on the subject of short selling does not concern about the performance amongst investors. Thereby, in this thesis, the aim has been to investigate whether there exist any significant performance differences amongst domestic and foreign investors when taking on short selling positions on the Swedish financial market.

As a majority of the research regarding short selling focuses on the short selling constraints and mechanisms. We thought that it might be of academic as well as professional interest to investigate the performances regarding short selling. Since 2012 this has been possible as The Swedish Financial Supervisory Authority (FI) publishes daily data to increase the market transparency.

The expectations were in line with previous literature which suggests that local investors perform better on their local markets. The explanations for these performance differences is that local investors seem to have an informational advantage in comparison to the foreign investors, who are often facing cultural, language and geographical barriers when investing abroad (Kalev et al., 2008; Baik et al., 2010; Coval & Moskowitz, 2001). The results that we have found contradicts to the previous research and our expectations.

The identified tendencies are that foreign investors appear to perform better on average compared to the domestic ones when examining the returns for the three-year sample in the interval through 2015-01-02 to 2018-03-19. In regard to the statistically significant results, we can infer that there are inclinations regarding average performance differences amongst the two investor groups. This is strongest shown in the regression considering CAR. Although, these inclinations are contradicting to previous research conducted by Kalev et al. (2008), Coval & Moskowitz (2001) and Baik et al. (2010) research, which argues that local investor would generate a higher yield when investing on their local market.

Through this thesis, it has become clear that there is a tangible difference amongst the investors. During the process, some new approaches occurred, and problems were encountered. This leads us to think about further research on the subject. As the short selling data provided by FI is relatively new, this thesis could be seen as a prelude to a more inclusive one in the future.
7.1 Limitations

This study was carried through via a quantitative research approach, focusing on short selling on the Swedish financial market. The authors are aware of the limitations of the sample as well as in the econometric procedures. The displayed results are only reflecting the results through the investigated time interval and for the concerned stocks. In this thesis, some of the results were significant, but the ability of generalization could be argued, not the least that the results are contradicting to previous research.

Therefore, we can only say that these results can be applied to this sample, in this Swedish setting. We cannot draw any conclusions about how the performance differences are on other financial markets or through another time interval.

7.2 Further Research

Another research approach which would be exciting for further studies is to increase the time horizon. This has had implications for our results and it would be interesting to see how the results would have been if the time was prolonged. During this study, a new question we derived through our research is why there is such an overrepresentation of foreign short sellers on the Swedish financial market, as well as if this might be the case for other similar countries.

The timing of the short selling positions would also be interesting to investigate. FI and Nasdaq OMX Nordic have shortlisted all dates for when the companies are communicating with the public, it would be interesting to see whether those dates correspond with an increase in short selling activities and what types of communication it might be.
References


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## Appendix A - Data structure

Example of how we organized the data in Excel.

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