Evaluation of the Nordic stock markets amidst the Russia- Ukraine war

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Abstract

The stock markets work as a public trading place for companies; however, it can be disrupted by global conflicts. These global conflicts can cause a significant impact on marketplaces especially smaller ones. This raises questions about the effects of global conflicts such as the war on smaller markets such as the Nordic region. Through these questions the impacts about the Russia-Ukraine war on Nordic stock markets and whether its effects differ from country to country were studied.
The goal was to define Nordic stock market performance amidst the Russia- Ukraine war and to find out which Nordic countries and chosen indexes suffered the biggest losses. Research implementation was quantitative.

Secondary quantitative data from 13 different Nordic stock market indexes were gathered from the NASDAQ OMX Nordic database. The indexes included general indexes and sector-specific indexes, which were analyzed using descriptive and correlational statistics with the IBM Statistics Software PSS. An overview of the data was obtained through descriptive statistics, and the relationships between the variables were demonstrated through correlation analysis. The chosen methods and carefully selected research methodology allowed for hypotheses testing and research questions to be answered in the study.

The empirical findings showed that the impact of the findings had a slightly larger effect on the Finnish OMX indexes compared to the other indexes. The results also showed that the direction and correlation were stronger in retail and technology. In conclusion, the research problems, questions, and hypotheses were answered. However, due to the topic being complex only directional answers were given, and for definitive answers further research is required.

Keywords/tags (subjects)

stock markets, war, Nordics, geopolitical risks, Russia-Ukraine, stock market measurement

Miscellaneous (Confidential information)

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Description

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Pohjoismaisten osakemarkkinoiden arviointi Venäjä- Ukraina sodan aikana

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Tiivistelmä

Osakemarkkinat toimivat yritysten julkisena kauppapaikkana, mutta maailmanlaajuiset konfliktit voivat häiritä niitä. Nämä maailmanlaajuiset konfliktit voivat aiheuttaa merkittäviä muutoksia erityisesti pienempiin markkinapaikkoihin. Tämä herättää kysymyksiä sotien ja muiden maailmanlaajuisten konfliktien vaikutuksista pienempiin markkinoihin, kuten Pohjoismaihin. Tämän kautta kysymyksiä Venäjän ja Ukrainan sodan vaikutuksista pohjoismaisiin osakemarkkinoihin tutkittiin ja sitä, vaihtelevatko sen vaikutukset maittain. Tavoitteena oli määritellä pohjoismaisten osakemarkkinoiden kehitys Venäjän ja Ukrainan sodan aikana ja selvittää, mitkä Pohjoismaat ja valitut indeksit kärsivät suurimmat tappiot. Tutkimuksen toteutus oli kvantitatiivinen.

NASDAQ OMX Nordicin tietokannasta kerättiin sekundaarista kvantitatiivista tietoa 13 eri pohjoismaisesta pörssi-indeksistä. Indeksit sisälsivät yleisindeksejä ja toimialakohtaisia indeksejä, joita analysoitiin kuvailevien ja korrelaatiotilastojen avulla IBM:n tilasto-ohjelmiston PSS:n avulla. Kuvailevien tilastojen avulla saatiin yleiskuva aineistosta, ja muuttujien väliset suhteet osoitettiin korrelaatioanalyysin avulla. Valitut menetelmät ja huolellisesti valittu tutkimusmenetelmä mahdollistivat hypoteesien testaamisen ja tutkimuskysymyksiin vastaamisen tutkimuksessa.

Empiiriset havainnot osoittivat, että havainnoilla oli hieman suurempi vaikutus Suomen OMX-indeksiin verrattuna muihin indekseihin. Tulokset osoittivat myös, että suunta ja korrelaatio olivat voimakkaampia vähittäiskaupassa ja teknologiassa. Yhteenvetona voidaan todeta, että tutkimusongelmat, kysymykset ja hypoteesit saatiin vastattua. Aiheen monimutkaisuuden vuoksi saatiin kuitenkin vain suuntaa antavia vastauksia, ja lopullisten vastausten saamiseksi tarvitaan lisätutkimusta.

Avainsanat

osakemarkkinat, sota, Pohjoismaat, geopoliittiset riskit, Venäjä- Ukraina, Osakemarkkinoiden mittaaminen

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1. Introduction

In the introduction section background of study, relevance of topic, motivation behind research, research questions and goals as well as thesis structure are discussed. Background of study will include information about the main topics circling the research. Relevance of topic will justify why the research is meaningful and what value it includes. Motivation of the research will include author's individual thoughts on why the research topic was chosen. Research questions and goals will include the research problem more specifically and the questions related to it, which will be further explored in the thesis. Thesis structure will go through how the body of the thesis is going to be conducted.

1.1 Background of study

This current study is influenced by the political crisis of Russia-Ukraine war and its impact on the Nordic stock markets. Additionally, there is limited amount of research on the Nordic stock markets amidst war events, hence making the research intriguing. "Prices of individual stocks reflect investors' hopes and fears about the upcoming future." This combined with high liquidity and the ease of data accessibility to today's news outlets makes the markets move fast in case of geopolitically significant events (Bikhchandani & Sharma, 2001). February 24th, 2022, Russia officially crossed the border of Ukraine and started its attack on multiple cities. Russia built military bases months before the start of the attack on the borders of Ukraine. With the horrors created by the Ukraine-Russia war, a new uncertainty for the global financial markets has appeared.

Global financial markets, especially those in the Nordic region, have been impacted by the ongoing conflict with Ukraine and Russia. Historically observing the conflict between Ukraine and Russia is only one of several geopolitical crises that have been the subject of studies looking into how financial markets are affected. Geopolitical concerns can significantly affect stock prices and market volatility, according to research done by (Jang & Kim, 2017; Nath, 2020; Reboredo & Ugolini, 2015). The conflict has affected major indexeses as well as individual sectors within the Nordic countries.

Studies have also looked at how geopolitical risk affects stock markets in Northern nations like Denmark, Sweden, and Finland (Grossmann & Simpson, 2019; Paunio, 2017). To evaluate the effects of the Ukraine-Russia conflict, within these countries and additionally Denmark, more research is required. Therefore, this study will be covering the major Nordic indexeses as well as sector specific indexeses from Finland, Sweden, and Denmark.

Finland, Sweden, and Denmark were chosen for this thesis because they are important economies in the Nordic region with well-developed stock markets. In addition to the reasons mentioned earlier, it is important to note that Finland, Sweden, and Denmark were chosen for this thesis because they have the highest quality of accessible data of the chosen sectors among the Nordic countries.

Through the studies discoveries can be made on which sectors suffered the most and which were least affected in a correlative and descriptive manner. Additionally, the study explores which of these chosen countries had the largest impact from the war, and what were the reasonings behind it. Based on the previous research made within the topic of geopolitical Crisis' and the lack of studies within the Nordic markets the research problem is formulated.

1.2 Relevance of the topic

The topic of the geopolitical crisis affecting stock markets and particular sectors is still not that widely researched, especially in smaller corner markets such as the Nordics. There is very limited research on modern war consequences in European societies, and the spillover effects of wars inside Europe, to other non-participating European countries (Ozili, 2022). Most of the research done is provided about major stock indexeses such as the American S&P 500. This research has its focuses on providing information about the Nordic markets during the Russia- Ukraine conflict to further improve the knowledge of different investor groups such as institutional, individual, and additionally help researchers for further studies on the topic.

Within this research thirteen different Nordic indexeses are studied and explored. These sectors are chosen since they are all very different from each other and help future research see which sectors are affected by geopolitical crisis' more than others.

1.3 Motivation

Evaluating Nordic stock markets amidst a geopolitical crisis is something that has not been researched extensively, since the previous research is mainly focused on bigger indexes. Stock markets and the financial industry are also a big interest of the author, and he follows them daily out of passion. The author has also invested on an active basis for the past five years, especially within the Nordic countries. Finance and economics are key interests of the author, which are both relevant when looking at geopolitical crisis and their financial impacts. Beginning of the Russia-Ukraine war has sparked plenty of interest in the media, but also among investors therefore making it an interesting topic.

This thesis topic is a mixture of the author's own passion for finance and the stock markets, combined with a lack of studies done within the Nordic stock markets. By conducting this thesis, insights towards geopolitical crisis expands and specifically towards smaller markets such as the Nordics. The results of this thesis will help not only the Nordics, but also other smaller corner markets. Possibly the thesis sparks new ideas, perspectives, or methods for future research.

1.4 Research questions and goals

There are two major research questions which build the foundation of this thesis project:

• RQ1 – How did the Ukraine-Russia war affect the performance of the Finnish stock market indexes', such as OMX Helsinki, in terms of returns compared to its Nordic peers?

• RQ2 - What is the magnitude and direction of the correlation between the Nordic stock market indexes within the retail, energy, and technology sectors during the Russia-Ukraine war, and what factors may explain the strength or weakness of these correlations?

To answer these specific questions indexes data from thirteen different Nordic indexes about publicly listed companies has been downloaded. The data is about General Nordic indexes such as OMX Nordic 40 which includes the 40 biggest companies within the Nordic region based off of market cap. Additionally sector specific indexes have been downloaded from Finland, Sweden, and

Denmark and these sectors are: Retail, Energy, and Technology. The First research question is examined through several variables divided into correlational and descriptive statistics that include multiple different statistical measurements within tables. Second research question is also interpreted through the same datasets and the goal of these datasets is to explore if there is a connection with the data to these specific questions.

1.5 Thesis structure

This Thesis structure is divided into an abstract, introduction, Theoretical literature review, methodology, results, discussion, and conclusion. The second part of the thesis covers a theoretical literature review, where the idea is to familiarize the reader with relevant studies and literature on the topic of the study. During the methodology phase chosen research methods, data collection, and data analysis are performed. In the results phase, the results of chosen data are transformed into visual form to provide information on the different variables it includes.

The results phase includes descriptive and correlational statistics. After the results general discussion, limitations, and future possibilities for the research questions and problems are explored. The conclusion phase includes the final words on whether the research was able to interpret the original research questions and provide useful insight for future research.

2. Theoretical literature review

This part of the research focuses on literature review. The aim of this literature review is to find out relevant literature and studies circling around the research questions and thesis topic.First step is to assess why Russia invaded Ukraine and what were the immediate economic effects of this invasion. After this the spillover effects of this war are studied since it is a relevant concept to understand for the scope of the study. Third part is an overview of the Nordic stock markets and their mechanics. After this the fourth phase is about exploring geopolitical risks and their effects on the stock markets. Behavioral finance will be explored as the fifth part of literature review and how it

can show during times of war. Sixth part of the literature review will go through sector analysis and especially relevant sectors for the war. Seventh and last part is about developing hypotheses based off the explored and analyzed literature about the topics mentioned above. For the research questions these topics and exploring them through existing literature is necessary.

2.1 Russia's invasion of Ukraine

To Understand the background of this event and why specifically the stock markets have been affected, it is important to go through history of these two countries and possible reasonings for the invasion. Hence the first part of the literature review goes through Russia's and Ukraine's historical tensions, invasion, sanctions caused by it and financial market reactions.

Russia and Ukraine have been going back and forth in terms of tensions the last few decades. 2014 was a major year for the rising tensions since Ukrainians protested Russia. These protests have been speculated to be one of the first catalysts for annexation of Crimea in 2014 (Ozili, 2022). However, it is argued that the historical tensions between Ukraine and Russia have been created through political, militarian, economical, and ideological differences (Ozili, 2022). in 24th of February 2022 years of tensions escalated even further with the invasion of Ukraine by the hand of Russia.

Factors such as energy related disputes, gas import prices, cultural, and territorial claims to what is Russia's "own land" have also significantly increased the tension between the two countries (Bluszcz & Valente, 2019). For the energy and import related disputes, Ukraine has argued with Russia about the import price fees and transiting fees. Russia still believes that some parts of Ukraine belong to it, back from the Soviet Union days. Which has led Russia to question Ukrainian culture in-terms of linguistics, independence, and traditions. Ukrainian government has emphasized on using the Ukrainian language instead of Russia, since they uphold their linguistic culture to a high standard (Maxwell, 2023). Combining all these factors and other elements that Russia has seen important, it started its attack to Ukraine on the 24th of February.

The actions of this event have received widespread international attention and affected the financial markets on a big scale. Multiple large scale stock indexes such as the S&P 500 and EURO Stoxx 600 dropped by over 5%, within only a few days after the invasion (Kantomaa, 2022). EU swiftly reacted with a military aid package providing a 500 million euro of lethal weapons to Ukraine, to help fight the war and possibly ease the markets (J.P. Morgan, 2022).

Western world has also placed multiple sanctions for Russia, to possibly help Ukraine and show Russia the consequences of this invasion. Russian banks and high technology exports have been the focus of these sanctions (J.P. Morgan, 2022). Banks are a vital component of any economy; therefore, the long-term effects of these sanctions are yet to be seen within the Russian economy. Long-term economic impacts are yet to be seen for both economies and Europe as a whole. However, the global financial markets have been quick to react since the financial world of the modern day is well connected, integrated, and the information flows quickly.

2.2 Economic Spillover effect of the war

For one to understand the large-scale economic effects of the Russia-Ukraine war in this research context it is important to establish how spillover effect can be measured since it is something that affects participant and non-participants during wars. Spillover effect in the financial context underlies, when the financial disruption in a particular country affects the financial markets at the global level (Kenton, 2019). An example of the spillover effect is the ongoing war between Russia and Ukraine, and its effects on global financial markets.

(Ozili, 2022) argues that since the European Union and the US forced certain policies and demands in Russia, they might cut the energy supply to countries that are dependent on it, hence creating a spillover effect. Spillover effects can also be observed in one's day to day life, for example increase of fuel prices on the local pumps among all the countries that Russia imported to is noticeable (Ozili, 2022). From these observations one could wonder how the inflation rates are affected by

these spillover effects.

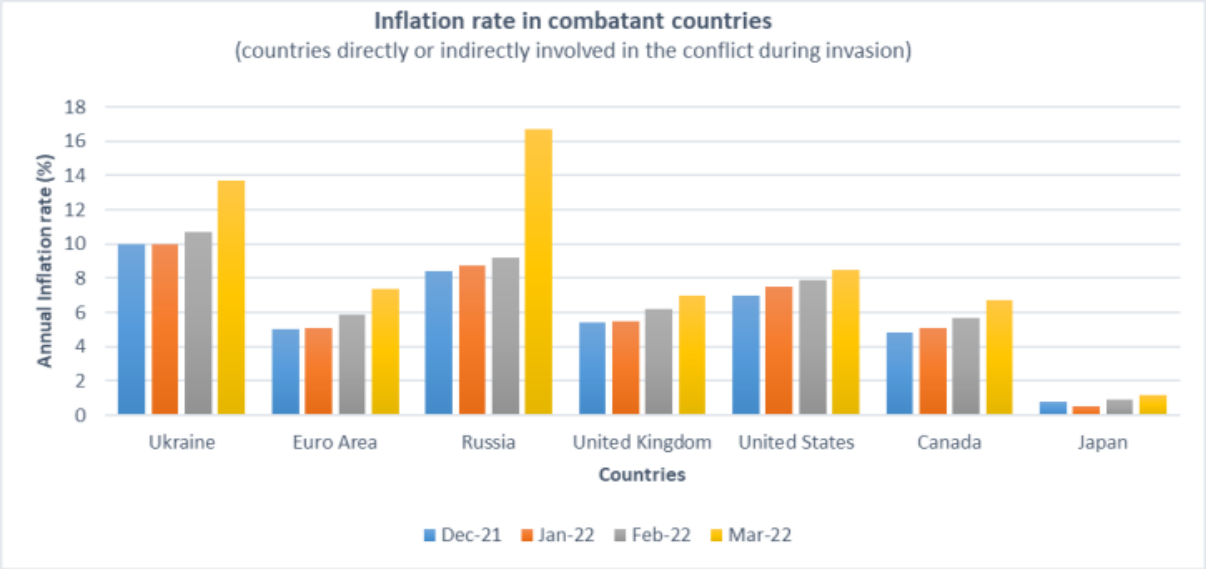

Figure 1 - (Ozili, 2022.) Inflation rate in combatant countries

From the figure above it can be seen that, especially the countries that are combatant countries and closely related to the war have received noticeable inflation increases. Observations can be made that especially the more geographically closer the country was towards the war, higher the inflation. According to previous research done by (Caldara et al., 2022) with the use of country-level panel data it is argued that geopolitical risks such as this militaria event do increase inflation.

During militaria events, the main drivers for rising inflation are higher commodity prices and disruptions among supply chains (Caldara et al., 2022). From the figure above it can be seen that this research statement is valid on the Russia-Ukraine war as well. This further emphasizes that the spillover effect from militaria event shows on very broad economic measurements such as the inflation meters.

According to (Muschamp et al., 2022) Not only current inflation is high but also the expectations of future numbers are expected to soar, furthering the spillover across all affected countries. Also consumer sentiment and generally tighter financial conditions are met. (Vuorela, 2015) speculates

that the negative economic sentiment lowers the spending towards “extra” assets such as stocks and would increase money outflows to personal accounts and hence putting heavy sell pressure towards stocks.

Russia and Ukraine both are also large exporters among various commodities and food products, which are currently being disrupt in logistics because of the war (Beraich et al., 2022). Russia’s threats of destroying some of Ukraine’s transportation infrastructure further worsened existing supply chains worries (Beraich et al., 2022).

According to research the spillover effect to European market indexes has been broad. However, from countries such as Finland, Norway and Poland all which border Russia the latter two had a positive stock market reaction post-event speculated to be since they are part of NATO (Boubaker et al., 2022). One could speculate that since Finland is not part of NATO its risk premium with political risk towards Russia is higher. One could speculate that this can be seen in the Finnish stock market indexes as a stronger reaction compared to the rest of the Nordics.

Finland also has multiple Large publicly listed companies with functions in Russia and during the times of crisis it can create operational difficulties. It is argued that possible additional sanctions set by the EU and the US can negatively affect the long-term exports to Russia making, forcing companies to consider other operational options (Vuorela, 2015).

2.3 Nordic stock markets

The Nordic stock markets are among the most important stock markets in Europe. This region is composed of five different countries, including Finland, Sweden, Denmark, Norway, and Iceland. The Nordic stock markets have a significant impact on the overall European economy and the world economy as well. The purpose of this section of the literature review is to provide insights and a general image of the Nordic stock markets, including their characteristics in terms of: size, transparency, returns, liquidity, volatility, and efficiency.

Nordic stock markets have some unique characteristics that distinguish them from other stock markets. One of the most notable characteristics is the size of the markets. The Nordic stock mar-

kets are relatively small compared to other European markets, like the famous London Stock Exchange or Germany's Frankfurt Stock Exchange. However, these marketplaces hold an remarkable impact on the overall European economy. For example, in 2021, the total market capitalization of the Nordic stock markets was approximately 1.5 trillion euros, which is equivalent to 3.3% of the total European market capitalization (Nasdaq, 2022).

Another characteristic of the Nordic stock markets is their high level of transparency. These markets are known for their strict regulations, which require companies to disclose all relevant information to investors. This level of transparency is essential in ensuring that investors have access to accurate and timely information about the companies they invest in. In addition, the Nordic stock markets have a high level of investor protection, which further enhances investor confidence in these markets.

Returns within the Nordics have been stronger than most European markets with Sweden as the leading Nordic market in-terms of returns (Mangeloja, 2001).

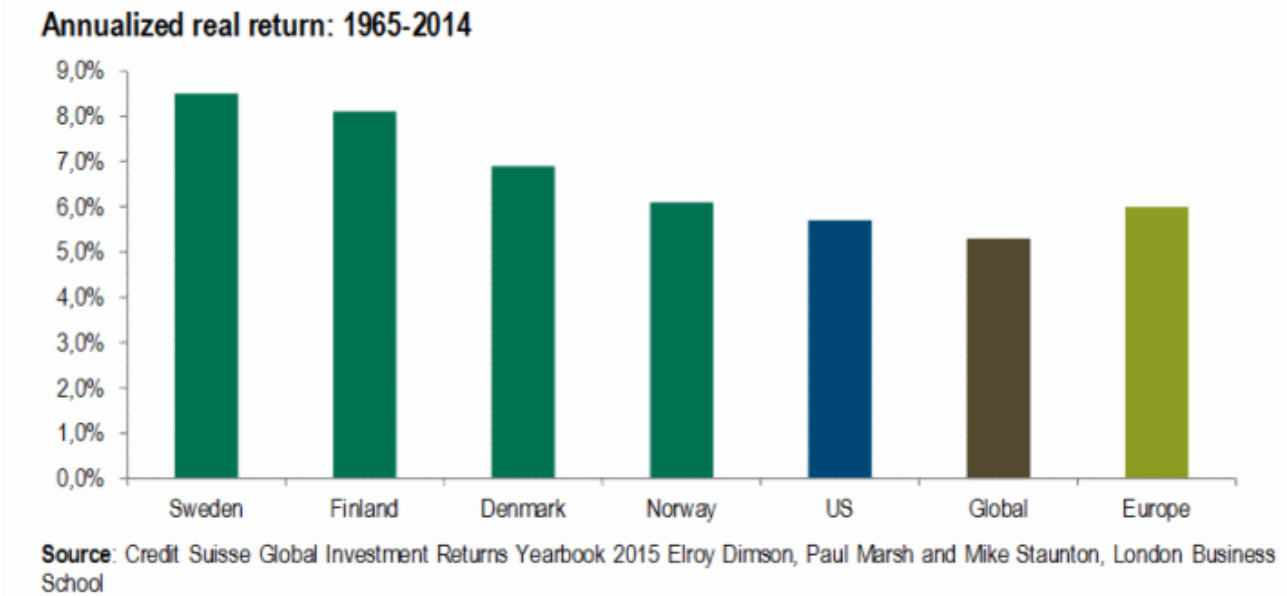

Figure 2 - Annualized real return: 1965- 2014 (Groette, 2021)

According to (Fjell, 2020) since the Nordics have a high standard of education, positive entrepreneur atmosphere and a high level of innovation they can provide strong results within the financial markets. One could argue that through the high level of education, investors could be more advanced in terms of dealing with abnormal situations.

Liquidity among the Nordic stock markets is another important factor to consider. The liquidity of a market refers to the ease with which securities can be bought and sold. In general, the Nordic stock markets are highly liquid (Garg, 2019). One of the key factors for the high liquidity is related to the limited size of these markets, which makes it easier for investors to buy and sell securities quickly.

In addition, the Nordic stock markets are known for their high trading volumes. This is particularly true for the Swedish and Finnish markets, which are the largest markets in the region. The high trading volumes in these markets contribute to their overall liquidity and make it easier for investors to buy and sell securities quickly and efficiently.

Volatility among the Nordic stock markets is another important factor to consider, and investors utilize it as important reference to their expected return (Garg, 2019). Volatility refers to the degree to which stock prices fluctuate over time (Cambridge Dictionary, 2023). In general, the Nordic stock markets are relatively stable compared to other European markets (Nasdaq, 2022). This is due in part to the strong economies of the Nordic countries, which are characterized by low inflation rates, low unemployment rates, and high levels of economic growth. However, during times of crisis smaller markets are expected to react extensively compared to bigger marketplaces, argues (Norvaišienė & Stankevičienė, 2022).

Market Efficiency of the Nordic stock markets is also an important factor to consider. An efficient market is theoretically one where its prices reflect all available information about the underlying securities, hence making them correctly priced (Malkiel, 2003). However, this theory is argued by (Choi, 2021), where she states that Market efficiency theory can lack even in advanced marketplaces if there are abnormal environments. In general, the Nordic stock markets are highly efficient. This is due in part to the high level of transparency and investor protection in these markets, which ensure that all relevant information is disclosed to investors in a timely and accurate manner. (Nasdaq, 2022).

2.4 Geopolitical risks and their effects on stock market returns

To understand the reactions of stock markets during geopolitical events academic literature circling the topic will be assessed. Therefore, this part of the literature review discusses the relationship

between geopolitical crises and militaria events. Historical militaria events will be assessed and their effects toward stock market returns.

Geopolitical risks refer to uncertainties in global politics that can affect financial markets, trade, and economic growth. The impact of geopolitical risks has received its share of extensive research since these events have often shaped our daily lives. Impacts of geopolitical risks, including war, on stock market volatility have been up to a significant number of studies.

Researchers have found that events such as political unrest, wars, and terrorism can cause a significant increase in stock market volatility. A study done by (Kanniainen & Yue, 2019), Discovered that the effect and scale of geopolitical risks were more significant in the emerging stock markets rather than developed markets. To support these statements a study by (Agoraki et al., 2022) also found that geopolitical risks had a negative impact on the stock market returns of 22 developed countries between 1973 and 2010.

Similarly, a study by Filis and Degiannakis (2011) found that geopolitical risks had a stronger impact on stock market volatility in the Eurozone compared to other regions, especially within the smaller markets. In the case of war, studies have shown that the likelihood of war can cause an increase in volatility in the lead up to the event, and a decrease in volatility once the conflict is resolved (Schneider & Troeger, 2006b).

In the case of war, past research and market reactions tell us that there is a fast initial downward spiral on average, which tends to accelerate the first weeks of the war. This reaction often loses fuel as the conflict starts to clear up in terms of information (Agoraki et al., 2022).

Researchers have found that some sectors are more vulnerable to geopolitical risks than others. For example, a study done by (Agoraki et al., 2022) found that the defence industry was positively affected by geopolitical risks, while the tourism and airline industries were negatively affected. Similarly, a study by (Sozzi, 2022) found that the energy and material sectors were the most sensitive to geopolitical risks. One could speculate that this can be due to energy being a high interest commodity among geopolitical risks historically.

Geopolitical risks, including war, are a crucial consideration for investors and policymakers, as they can significantly impact stock market volatility and returns. While the impact of geopolitical risks on stock markets may be difficult to predict, research has shown that certain sectors are more vulnerable than others. As such, investors may want to consider diversifying their portfolios across different sectors and countries to mitigate the impact of geopolitical risks.

Wars have been ongoing within our globe for thousands and thousands of years. Throughout history, financial markets have existed in multiple forms and the idea of capitalizing a gain from a trade has also been rooted within human nature for a long time. Whether it has been selling and buying of spices in the past or trading within today's digital financial markets, individuals have attempted raking profits on it (Boubaker et al., 2022). However, these market conditions have been disrupted multiple times throughout history by different war events, such as The World War Two, Pearl harbour, and today's Russia-Ukraine conflict. To understand why these events, disrupt the markets, one must first investigate relevant theories and research around the topic.

In Autumn 1830 financier James Rothschild wrote to his brother "that their 900 000 francs in government securities will stand at 75% if peace is maintained. If there is war, they will fall to 45%" (Kaun, 1990). This shows that even in the very early days of investing wars and geopolitical tensions have created uncertainties among investors and fears of volatility.

According to research done by (De Bondt, 1989) Price reversals are exceptionally strong with fearsome risks and events that stimulate a high amount of anxiety, discomfort, and fear. Geopolitical events especially quickly occurring ones can be categorized as "black swan" events, which means that they couldn't be predicted beforehand, therefore creating a big initial shock (Scott, 2019).

According to research investors are quick to ask themselves whether there is a link with the occurring geopolitical event towards their portfolio and markets (J.P. Morgan, 2022). Research also suggests that the less educated the investor the more anxious one will be amidst a crisis (Lim & Kim, 2018). However, many war-related companies such as gun providers, can have their stock quickly increase in price amidst a new political conflict involving lethal weaponry (Kaun, 1990). This showcases that even in the most horrible crisis, one can come out positive with a nonhedged portfolio if stock picking is done right.

As Baron Rothschild disputably once said “the time to buy is when there is blood on streets” (Kaun 1990). Precise meaning of this quote is hard to guess, however it is interpreted that when the atmosphere and emotions towards the financial markets are very negative it is usually a good time to be on the buying side (Zaremba et al., 2022). This argument can be supported within a geopolitical crisis context since most geopolitical events have had a short impact within the stock market indexes and most markets have had a positive reaction after the initial selling wave.

Date	Select geopolitical/ military events	1-month later	3-months later	6-months later	12-months later
12/7/1941	Pearl Harbor	-3.4%	-12.7%	-9.1%	0.4%
10/31/1956	Suez Canal crisis	-2.8%	-3.8%	-0.1%	-11.5%
10/20/1962	Cuban missile crisis	8.7%	17.7%	25.1%	32.0%
10/17/1973	Arab oil embargo	-7.0%	-13.2%	-14.4%	-36.2%
11/3/1979	Iranian hostage crisis	4.2%	11.6%	3.8%	24.3%
12/25/1979	U.S.S.R. in Afghanistan	5.6%	-7.9%	6.9%	25.7%
8/3/1990	Iraq invades Kuwait	-8.2%	-13.5%	-2.1%	10.1%
1/17/1991	Gulf War	15.2%	23.5%	20.6%	33.1%
8/17/1991	Gorbachev coup	0.0%	3.0%	7.0%	8.9%
2/26/1993	World Trade Center bombing	1.2%	2.5%	4.0%	6.4%
9/11/2001	9/11	-0.2%	2.5%	6.7%	-18.4%
3/20/2003	Iraq War	2.2%	15.6%	17.4%	28.4%
	Average	**1.3%**	**2.1%**	**5.5%**	**8.6%**
	% Positive	**50%**	**58%**	**67%**	**75%**

Figure 3 - How the S&P 500 has historically performed during geopolitical/military events (Sozzi, 2022)

Figure 3 provides insight on the different geopolitical crises with military event emphasis. From the figure in some cases the initial 1-month period has been very volatile upwards and downwards yet averaging a positive 1,3% return on average. Observing the other periods 3-month, 6-month, and 12-month, it can be discovered that almost all the events resulted in a positive return.

By the end of the tracking period only three of the militaria events were negative, however it is important to note that they provided significant negative returns. However, looking at the overall average return, it can be argued that an individual investor would have been better without doubting him or herself during these events and just kept holding their portfolio, since on average the 12-month hold period would have accounted with an 8,6% average return.

However, the figure only contains data from S&P 500 during these events, hence further research is required on the smaller indexes and corner markets. Returns of this figure can be speculated, since financial markets often look to the future rather than the current moment. Therefore, this figure could tell us that stock markets expected these specific geopolitical events to be short-lasted and hence following up a rally upwards after the initial volatile movements. Important note to make is that all these militaria events included different geopolitical risks and in different areas hence it is important to understand their mechanics going forward.

2.5 Behavioral finance

To acquire an in-depth comprehension of the different phenomena's' on stock markets, it is essential to establish a clear comprehension of the principles of behavioural finance, particularly during times of geopolitical crises, such as militaria events. The study of behavioural finance provides valuable insights into how psychological factors, including emotions and cognitive biases, influence investors' behaviour during abnormal times.

This part of the literature review aims to explore the psychological factors and models that affect the behaviour of individual investors and therefore affecting asset pricing in the financial markets. This is particularly relevant to geopolitical events, since they are often linked with very strong feelings such as despair, fear, and anxiety which might cause irrational actions. First sightings of behavioral finance are recorded all the way back in the 1800's when in 1841 when a book called "MacKay's extraordinary popular delusions and the madness of crowds" was published. The book represented various scenarios of individuals panicking throughout history and how it affected their situations economically (Ricciardi & Simon, 2000).

Behavioral finance differs from traditional finance, since it includes concepts from psychology, finance, and sociology. According to research behavioral finance has emerged to respond towards the difficulties faced in the traditional rational investor paradigm (Barberis & Thaler, 2002). This paradigm suggests that investors follow rational behaviour which is not the case according to behavioral finance. Behavioral finance arguments that certain financial market situations and their causes can be better understood using models where the individual is not fully rational in their decision making (Barberis & Thaler, 2002).

According to a noticable amount of psychological literature available, behavioral finance argues that individuals do make systematic errors in the way they think. According to (Ritter, 2003) Feelings of overconfidence, placing trust in the past, and current mental health might create distortions in decision making. Behavioral finance suggests that these factors should be included in decision making, instead of using the basic Von Neuman –Morgenstern utility and arbitrage theories, which don't include these elements (Ritter, 2003).

These systematic errors behavioural finance sees as emotional biases, which all occur in a different phase of the market cycle. For example, biases such as overconfidence are very visible during financial bubbles. (Hens & Benli, 2021b). Even before the Russia- Ukraine war, in the beginning of 2022 investors had a lot on their mind since index valuations were high and energy crisis was consistently discussed and worried about (JP.Morgan 2022).

Like mentioned above immediately after the invasion of Russia the stock markets quickly started melting to a downward spiral. Russia's neighbouring country Finland and its Helsinki stock exchange and its major stock indexes OMXHGI fell by over 10% in the first two weeks after the invasion and war had started, which was more than its neighbouring Nordic countries (Kantomaa, 2022). This shows that Finnish investors might have applied the emotional bias of fear amidst the crisis, and this might be due to Finland being a neighbouring country to Russia with a long history between eachother.

Finnish economy is also dependent on Russia like mentioned above and the spillover effect was yet to be fully seen which might have affected the strength of this reaction. Markets are said to be future looking therefore they react right as the news hit the outlets, since future impacts are being measured by investors in that moment (Kantomaa, 2022). There is a limited amount of research

done on individual investor behaviour but (Hens & Benli, 2021b) argues that, amidst militarian crisis' investor behaviour is comparable to any other extreme situation such as the covid-19 crisis. During times of crisis, it is not a new thing to adopt herd mentality and according to research by (Bikhchandani & Sharma, 2001), individual investor can quickly forget strategy, portfolio goals, and allocation if outlets are giving constant negative messages.

During times of war news outlets are spiking in articles therefore it can be speculated that Finnish investors were overflown with data which might have affected their emotional decision making. During times of trouble, it is also researched that willingness of taking risk goes down and safe havens become a more intriguing investment decision (Bikhchandani & Sharma, 2001). This might be due to the initial idea of protecting one's capital or a sign of herd bias created by external factors such as the media (Boubaker et al., 2022).

2.6 Sector analysis

To fully comprehend the financial performance of stock markets and sectors, it is crucial to understand the significance of indexes, and more specifically the specific sectors within them. Therefore this part of the literature review aims to assess relevant academic literature for sector analysis. By understanding specific sectors and industries more comprehensively, one can interpret the stock market changes within those sectors and industries with a critical outlook.

Historically it has been explored that traditional sectors such as energy and retail provide negative performance during militaria events (Ozili, 2022). On the other hand, according to (Schneider & Troeger, 2006a), the technology sector has been relatively strong compared to the retail and energy industry. These sectors and their mechanics will be further explored through academic literature since their performance will be measured during the data phase.

2.6.1 Energy sector

The energy sector is a critical component of the global economy, and its companies are involved in traditional industries that produce commodities such as oil, gas, coal, and renewable sources (by,

2022). Energy prices and geopolitical risks can significantly impact the sector's performance, affecting stock prices and investor sentiment. For example, tensions in oil-producing regions like the Middle East can increase volatility in the energy sector, leading to lower stock prices.

Research has shown that energy prices are highly correlated with stock prices in the energy sector (Bertelsen & Sedlacek, 2014). When energy prices rise, stock prices in the sector tend to increase, while a decline in energy prices can lead to lower stock prices. Renewable energy sources, such as solar and wind power, are becoming increasingly crucial to the energy sector. Many countries are adopting policies to encourage the adoption of renewable energy, which is expected to have significant implications for the sector, with some experts predicting that renewable energy companies may eventually become dominant players in the sector. Additionally (Bertelsen & Sedlacek, 2014) claims that Energy sector is a vital component within the stock market and is especially in line with larger industries.

2.6.2 Technology sector

The technology sector comprises companies involved in the production and distribution of technology products and services. This includes hardware, software, internet services, and e-commerce. This sector's performance is influenced by changes in consumer behavior, technological advancements, and regulatory changes, and it is highly sensitive to market sentiment and investor expectations (Deloitte, 2019).

Technology stocks have experienced significant growth and generated substantial returns for investors in recent years. However, the sector's volatility is an ongoing issue, with technology stocks experiencing significant price swings in response to market events. Investor sentiment is a significant factor in this volatility, with market expectations playing a critical role in the sector's performance. (Deloitte, 2019) argues that even though technology companies are highly it-based, some companies do utilize components making it correlative with traditional industries aswell in times of crisis.

2.6.3 Retail sector

The retail sector encompasses companies involved in the sale of consumer goods and services to the public, including brick-and-mortar stores, e-commerce retailers, and logistics companies. This sector's performance is driven by consumer spending habits, economic trends, and market competition.

According to (Deloitte, 2019) Retail companies are increasingly embracing technology, with the adoption of e-commerce platforms and digital marketing strategies. This has transformed the retail industry, providing opportunities for growth and innovation, but also creating significant competition between traditional brick-and-mortar retailers and e-commerce companies. Retail companies are also affected by geopolitical risks, such as trade disputes or sanctions, which can impact supply chains and consumer demand (Mattsson, 2009).

2.7 Hypothesis development

Since the literature review for the research topic has been established and explained, the next step is to develop hypotheses based on the literature review theories and studies. Hypothesis is an assumption on something that can happen based off the premises of the research. Hypotheses are tested throughout the research by the findings of the study. Hypotheses include an important part of the study since they link data, research questions and literature review into one. According to (Kothari, 2004) Hypothesis in research is a very niche statement which explains what is expected to happen in the study.

Based on the literature review done on the topic the following two hypotheses were created:

H1 Russia- Ukraine war has affected the Finnish stock market more than the other Nordic financial markets.

H2 The corelation between the retail and technology sector is positive in all Nordic markets.

H3 The correlation between the energy and other sectors is either negative or weaker.

The author hypothesizes that due to the literature accessed and analysed, Finnish stock markets have likely performed worse than other Nordic markets. Additionally, the author hypothesizes that through the academic literature interpreted the correlation between the retail and technology sector is positive in all Nordic markets. For the third hypothesis the author expects that the correlation between the energy and other sectors is either negative or weaker and this is due to the literature accessed in the previous phase of the research.

3. Methodology

In this part of the thesis different phases of the methodology will be explained. According to (Business Research Methodology, 2011) Methodology phase of the research describes the approaches taken in terms of research design, data collection, data analysis, and research ethics. Hence the following chapters will include information on how the design is formulated, where and what sort of data is collected, how is the data analysis conducted, and what ethical considerations are there in the scope of this research.

3.1 Research design

The nature of this research is quantitative, which refers to utilizing numerical data and using specific statistical measures and techniques to access results. Even though Quantitative research is based off numerical data it can still provide answers to questions such as: how, where, and how many (Apuke, 2017). These answers are formed through interpretation of the gained results. In this research two major statistical categories are utilized, descriptive, and correlational. Secondary data including daily performance and returns of Nordic general indexes and sector indexes have been collected from OMXNASDAQ to quantify the research questions. Additionally, Finnish. Swedish and Danish retail, technology, and energy indexes datasets have been downloaded to measure the sector effects.

Descriptive statistics can be used to measure the first research question, “How did the Ukraine-Russia war affect the performance of Finnish stock market indexes’ such as OMX Helsinki, in terms of returns?”. This is due to the data’s compatibility towards Descriptive statistic measurements such as standard deviation, mean, and mode. Correlational statistics can be used to measure the second research question “How strong were the spillover effects of the war in other Nordic stock markets, and did the Nordic indexes have strong correlations in terms of returns”.

This way of analyzing is fit for this question since it measures multiple different variables and hence it can test the relationships between each variable. For the third and final research question: “Which of the chosen sectors had the biggest and weakest correlations amidst the war” Correlational statistics can be utilized to see which sectors were the most correlative between each other.

Main objective of this research is to provide an understanding of greater extent towards the Russia-Ukraine conflict and its impacts on the Finnish stock markets as well as its spillover effects to other Nordic countries. To further our understanding of the geopolitical risks, particularly militaria events in smaller corner market countries such as Finland above mentioned statistical methods are utilized. These datasets help to analyze whether the initial shock and pressure of this geopolitical risk was felt stronger in Finland than in its other neighboring Nordic countries, due to the neighboring and historical factors of Finland’s and Russia’s history.

For one to visualize the overall effect within the Nordic markets, general Nordic indexes datasets have also been downloaded. General Nordic indexes include all the Nordic countries and their specific companies of that specific measurement. Additionally sector specific indexes from Technology, retail, and the Energy industry were chosen for the research. These choices are based off the fact that they are all very different in-terms of earnings hence making the analysis phase broad. Additionally (Mangeloja, 2001) argues that when applying industry-specific indexes with general indexes, to daily return and performance based research it removes the large structural differences and causes nonbiased results.

Indexes data has been collected from OMXNASDAQ and used to compare statistics. As previously mentioned above in the literature review, war events are not as studied in the Nordic area as they are in the American indexes. Therefore, the study tries to provide a further understanding of war events' impacts and their effects on the Nordic stock market indexes and sectors. Additionally, these

sets of data also further help us to understand whether the hypothesis that militaria conflicts have a negative effect on the short-term of the markets and a positive 6–12-month reaction.

3.2 Data collection

Data collection is divided into two different categories: primary data and secondary data. According to (Ajayi, 2017) Primary data is completely original and unique which can be collected through methods such as: observing a set of people, filing surveys about a specific topic, interviewing a focus group and multiple other methods decided by the researcher. Secondary data requires less effort to obtain, however secondary data is not as raw, since these datasets have previous statistic measurements done to them (Bryman & Bell, 2015). Example sources of secondary data are websites, books, journals, articles, and other records (Ajayi, 2017). Since this research is quantitative and focuses on the stock markets, secondary data is more accessible and hence utilized in the research.

Data from thirteen different indexes in the Nordic region was obtained for the grounds of this study. The general Nordic as well as technology, retail, and energy indexes data was obtained through Nasdaqomxnordic.com. These indexes are chosen in the form of GI indexes' instead of PI is due to the reason that GI considers dividends along with price changes, and therefore gives a more realistic picture of the returns, since PI only considers price changes. These indexes datasets are considered secondary data, which means that the data is defined as data that has been previously obtained and collected by someone else for some other specific purpose (Martins et al., 2018).

From these datasets the daily performance of chosen indexes were downloaded from the period of 24th of February 2022, starting date of the war and ending at 24th of November Providing a 10-month timeline since the beginning of the war. In accordance with (Andrade, 2020) a sample size larger than 150 is academically valid, since studies related to stock data with low sample size, might include statistical noise in the data. Therefore, these dates were chosen in the widest timeframe during the time of gathering, and the number of samples gathered formed to be 192. Due to the high sample size the formulated research questions can be widely explored. The thirteen chosen indexes are the following (Nasdaq OMX All-share, Benchmark and Sector indexeses):

Table 1 – Description of variables

Variable name	Description
OMX Nordic 40	Stock indexes which tracks the 40 largest companies within the Nordic region.
OMX Nordic Large cap EUR GI	Stock indexes which tracks the performance of the largest 25% of companies within Finland, Sweden, and Denmark.
OMX Nordic Mid cap EUR GI	Stock indexes which tracks the performance of Finnish, Swedish, and Danish companies with more than 150million euro market capitalization but less than 1 billion.
OMX Nordic Small cap EUR GI	Stock indexes which tracks the performance of Finnish, Swedish, and Danish companies with less than 150-million-euro market capitalization.
OMX Stockholm Technology EUR GI	Stock indexes which tracks the performance of publicly listed technology companies within Sweden.
OMX Helsinki Technology EUR GI	Stock indexes which tracks the performance of publicly listed technology companies within Finland

OMX Copenhagen Technology EUR GI	Stock indexes which tracks the performance of publicly listed technology companies within Denmark
OMX Stockholm Retail EUR GI	Stock indexes which tracks the performance of publicly listed retail companies within Sweden.
OMX Helsinki Retail EUR GI	Stock indexes which tracks the performance of publicly listed retail companies within Finland
OMX Copenhagen Retail EUR GI	Stock indexes which tracks the performance of publicly listed retail companies within Denmark
OMX Stockholm Energy EUR GI	Stock indexes which tracks the performance of publicly listed energy companies within Sweden
OMX Helsinki Energy EUR GI	Stock indexes which tracks the performance of publicly listed energy companies within Finland
OMX Copenhagen Energy EUR GI	Stock indexes which tracks the performance of publicly listed energy companies within Denmark

To assess the indexes and their performances during the time of Russia-Ukraine war market-based measures are utilized. The choice of these indexes and analysis methods are based off the research questions. The Finnish indexes are to see whether Finland performed worse than the other

Nordic countries on a sector level. The Nordic general indexes such as OMX Nordic 40 are downloaded to see the spillover effects to other countries within the Nordics. Lastly the Finnish, Swedish, and Danish sector specific indexes are downloaded to see which of them correlated the most amidst the war.

3.3 Data analysis

As reported by (Saunders et al., 2012) quantitative data reveals very little detail and explanation to individuals interpreting it. Hence these datasets need to be analyzed and processed to transform them into a useful form where information can be interpreted properly. Quantitative techniques such as charts and graphs ease the process of understanding the relationships and trends within our data. Since the secondary data will be collected from OMXNasdaqnordic.com, and the data will be transferred into excel the first part of data analysis is formatting the data in excel.

After the data is formatted in excel, the author compiles all the collected data and processes it into SPSS to further analyze it. Within SPSS the data is formed into different variables, and they will be measured in descriptive and correlational manner to answer the research questions. All the descriptive and correlational statistics will be labeled and categorized after their specific measurements. After creating the statistics and processing the data into a singular SPSS document, the author will download it back into excel to further format it. Within Excel the variables and tables received from SPSS will now be formatted into charts and different graphs to help the visual side of the data.

When conducting data analysis, it is essential to be able to accurately describe and interpret the data. The mean, for example, is a measure of central tendency that represents the average value of a set of data (Bryman & Bell, 2015). It is calculated by adding up all the values in the set and dividing the sum by the number of observations. The median is another measure of central tendency that represents the middle value in a data set when arranged in order from smallest to largest. The mode is the most frequently occurring value in a set of data (Bryan-Jones et al., 1983).

Standard deviation is a measure of variability that indicates the degree to which data points differ from the mean. It is calculated by determining the square root of the average squared differences

from the mean (Bryan-Jones et al., 1983). Skewness is a measure of the symmetry of a distribution. A distribution is symmetrical if the left and right halves of the distribution are mirror images of each other. If one half of the distribution is longer than the other, the distribution is said to be skewed. The standard error of skewness is a measure of the variability of the skewness estimate (Bryan-Jones et al., 1983).

Kurtosis is a statistical measure of the degree of peakedness of a distribution. A distribution with positive kurtosis is more peaked than a normal distribution, while a distribution with negative kurtosis is less peaked (Peck et al., 2000). The standard error of kurtosis is a measure of the variability of the kurtosis estimate. The range is the difference between the highest and lowest values in a set of data. The minimum is the smallest value in a set, while the maximum is the largest value (Peck et al., 2000).

Finally, Pearson correlation and its associated significance test (2-tailed) are used to measure the strength and direction of the linear relationship between two variables (Peck et al., 2000). The Pearson correlation coefficient ranges from -1 to 1, where -1 indicates a perfect negative relationship, 0 indicates no relationship, and 1 indicates a perfect positive relationship. The significance test assesses the probability that the correlation coefficient is zero (Peck et al., 2000). A significant p-value suggests that the correlation coefficient is unlikely to be zero and that there is evidence of a relationship between the two variables.

Table 2 - Statistical variables

Variable	Description	Formula
Mean	The average value of data in a dataset. Utilized in descriptive statistics.	Sum of all values divided by the number of observations

Median	Middle value in a data set	Value at the center when data is arranged in order
Mode	Most frequently occurring value	Value that appears most frequently in the data set, hence no formula
Standard deviation	The most frequently occurring number within a data set. Utilized in descriptive statistics.	Square root of the average squared differences from the mean
Skewness	Measure of the symmetry of a distribution. Utilized in descriptive statistics.	Positive or negative value indicating the direction and degree of skewness
Standard error of Skewness	Measure of variability of the skewness estimate. Utilized in descriptive statistics.	Calculate based on the sample size
Kurtosis	Measure of the peak of a distribution. Utilized in descriptive statistics.	Positive or negative value indicating the degree of peakness, hence no specific formula.
Standard error of kurtosis	Measure of variability of the kurtosis estimate. Utilized in descriptive statistics.	Calculate based on the sample size
Range	Difference with the highest and lowest values in a data set. Utilized in descriptive statistics.	Highest value – the lowest value

Minimum	Smallest value in a data set. Utilized in descriptive statistics.	Lowest value observed
Maximum	Largest value in a data set. Utilized in descriptive statistics.	Highest value observed
Pearson correlation	Measure of the strength and direction of linear relationship between two variables. Utilized in correlational statistics.	Ranges from -1 to 1, with -1 indicating a perfect negative relationship where 0 indicates no relationship, and 1 indicating a perfect positive relationship.
Significance test (2-tailed)	Probability that the correlation coefficient is zero. Utilized in correlational statistics.	Assessed using p-value, with a significant p-value suggesting evidence of a relationship between the two variables.

3.4 Research ethics

Topic of research ethics is becoming a more up to date topic, since technological developments are drastically changing the nature of research and society (Lanzerath, 2023). Therefore, it is more important than ever to utilize credible data in research and maintain a certain standard. If data is chosen from noncredible sources the research causes ethical threats which affects the credibility

of the research (Lanzerath, 2023). Research ethics are mainly considered to be a problem of primary data, however secondary data does have its downsides in ethical terms aswell. If the data is obtained through a private sector company, conflicts of interest, intellectual property, and bias' might have been applied.

In author's case since the secondary data collection will be conducted through download of datasets from NasdaqOMXNordic.com, the author will trust the data source since it is provided by the official stock market data providers. Institutions such as the Nasdaq follow strict guidelines must operate within certain principles, hence ensuring that ethical conditions are being met (Tubaro, 2015). Additionally, even though this research includes authors individual interests and motivations the research process will be conducted by ethical guidelines.

4. Results

During this part of the research results from made analyses are presented in visual form and interpreted with the scope of the research. First section represents descriptive statistics, it shows the data and variables used for the table. Second subchapter goes more in-depth on correlation analysis and its results from the utilized data.

4.1 Descriptive statistics

According to (Vetter, 2017) descriptive statistics are methods to describe and explain numerical research data. Descriptive statistics can be reported with just numbers or in tables or, or graphically with visual figures (Vetter, 2017). This research includes the descriptive statistics in a visual form through a table. The table was chosen, since the amount of data analysed is large and hence making it easier to read rather than just providing it in numerical fashion. After the table is read from its visual form the results off the data utilized for the table will be interpreted into text form. The goal of this dataset is to find answers towards the research questions and hypotheses. Additionally the results provide possible extra value towards future studies of Nordic stock markets.

Table 3 - Descriptive statistics

Descriptive statistics	Valid	Missing	Mean	Median	Mode	Std. Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis	Range	Minimum	Maximum
OMXNORDIC40Change	*191*	*1*	*0,00036*	*-0,001*	*-0,0018*	*0,01388*	*0,184*	*0,176*	*0,148*	*0,35*	*0,0817*	*-0,0409*	*0,0408*
OMXNLARGEChange	*191*	*1*	*0,00012*	*-0,0005*	*-,01060a*	*0,01516*	*0,186*	*0,176*	*0,222*	*0,35*	*0,0921*	*-0,0446*	*0,0475*
OMXNMIDChange	*191*	*1*	*-0,0005*	*-0,0007*	*-,00730a*	*0,0138*	*0,001*	*0,176*	*1,009*	*0,35*	*0,092*	*-0,0489*	*0,0431*
OMXNSMALLChanges	*191*	*1*	*-0,00043*	*0,0003*	*-,01200a*	*0,01129*	*-0,151*	*0,176*	*2,916*	*0,35*	*0,0862*	*-0,0432*	*0,043*
OMXStockholmTechnology	*191*	*1*	*-0,00027*	*-0,0018*	*-0,0057*	*0,02131*	*0,579*	*0,176*	*0,799*	*0,35*	*0,1316*	*-0,0499*	*0,0817*
OMXHelsinkiTechnology	*192*	*0*	*-0,00076*	*0,0001*	*,000100a*	*0,01829*	*0,18*	*0,175*	*0,664*	*0,349*	*0,121*	*-0,0595*	*0,0615*
OMXCopenhagenTechnology	*189*	*3*	*-0,00074*	*-0,0019*	*-,03240a*	*0,02543*	*0,429*	*0,177*	*0,487*	*0,352*	*0,1492*	*-0,0581*	*0,0911*
OMXStockholmRetail	*190*	*2*	*-0,00135*	*0,0002*	*-,02320a*	*0,02351*	*-0,417*	*0,176*	*1,671*	*0,351*	*0,1779*	*-0,1029*	*0,075*
OMXHelsinkiRetail	*192*	*0*	*-0,00141*	*-0,0003*	*-0,0098*	*0,01917*	*0,028*	*0,175*	*0,062*	*0,349*	*0,1122*	*-0,0601*	*0,0521*
OMXCopenhagenRetail	*189*	*3*	*-0,00088*	*0,0005*	*,00050a*	*0,01737*	*-0,067*	*0,177*	*-0,05*	*0,352*	*0,0958*	*-0,0515*	*0,0443*

OMXStockholmEnergy	*191*	*1*	*0,0018*	*0,0029*	*-,00110a*	*0,02361*	*-0,097*	*0,176*	*1,32*	*0,35*	*0,1599*	*-0,074*	*0,0859*
OMXHelsinkiEnergy	*187*	*5*	*0,00246*	*0,00141*	*-,10262a*	*0,02996*	*0,011*	*0,178*	*4,096*	*0,354*	*0,24515*	*-0,10262*	*0,14254*
OMXCopenhagenEnergy	*189*	*3*	*0,00128*	*-0,0031*	*-0,0142*	*0,03768*	*1,041*	*0,177*	*2,563*	*0,352*	*0,2352*	*-0,0779*	*0,1573*

The variables mentioned in data analysis phase are utilized in table 1 which is presented above. Table 1 includes information about the descriptive statistics, for thirteen different indices and twelve statistical variables related to stock market performance. The table includes general Nordic indexes and three countries with specific sector indexes from: Sweden, Finland, and Denmark.

The data presented in the table represents the daily performance and percentage changes in these various markets during the Russia-Ukraine war. By analyzing the data one can gain insight into the behavior of these indexes during the times of militaria events. The variables include the daily changes in the OMXNORDIC40, OMXNLARGE, OMXNMID, OMXNSMALL, OMXStockholmTechnology, OMXHelsinkiTechnology, OMXCopenhagenTechnology, OMXStockholmRetail, OMXHelsinkiRetail, OMXCopenhagenRetail, OMXStockholmEnergy, OMXHelsinkiEnergy, and OMXCopenhagenEnergy.

The sample size for each variable is 191 or 192, apart from OMXHelsinkiTechnology, which has a missing value. The valid data ranges from 189 to 192, and missing values range from 0 to 3. The range of values varies between variables, with some variables having negative values and others having positive values. However, the data is of high quality since there are only very low amounts of missing variables, hence making it academically acceptable.

The mean values for the variables range from -0.00141 to 0.00246, indicating that on average, there were small changes in the stock market values for these Nordic countries. The median values are also close to zero, ranging from -0.0031 to 0.0029, suggesting that the data are relatively symmetrically distributed. However, the mode values are more varied, ranging from -0.0324 to 0.0001, indicating that the data are not always normally distributed.

The standard deviation values for the variables range from 0.01129 to 0.03768, indicating that the values are relatively spread out from the mean. The skewness values range from -0.417 to 0.579, with most variables having positive skewness values, indicating that the data are skewed to the right. The standard error of skewness values ranges from 0.175 to 0.178, indicating that the skewness values are reliable. The kurtosis values range from -0.1029 to 4.096, with most variables having positive kurtosis values, indicating that the data have more outliers than a normal distribution.

The standard error of kurtosis values range from 0.0443 to 0.1573, indicating that the kurtosis values are reliable.

The descriptive statistics suggest that the data are relatively normally distributed, although there are some outliers in the data. The outliers are especially the Finnish Helsinki indexes which migh be due to different psychological factors such as being a neighboring country to Russia, hence creating a selling wave. Therefore, one could argue that Behavioral finance affected Finnish investors. The positive skewness and kurtosis values suggest that the data have more high values than low values, which may indicate that the stock market performance was generally positive during the time of the study.

As such, this data is relevant to anyone interested in understanding the economic and financial landscape of the region. However, further analysis would be needed to confirm these findings and investigate any underlying patterns or relationships in the data.

4.2 Correlational statistics

According to (Bewick et al., 2003) when dealing with two or more quantitative variables there are two major statistical measures to utilize; correlation or linear regression. In this research correlation is the chosen method and it will be utilized through a table that includes dataset about thirteen different Nordic stock indices.

Table 4 - Correlation statistics

	OMXN40D RET	OMXNLD RET	OMXNMD RET	OMXSD RET	OMXSTD RET	OMXHTD RET	OMXCTD RET	OMXSD RET	OMXHRD RET	OMXCD RET	OMXSED RET	OMXHED RET	OMXCED RET
OMXNORDIC40Change	1	,980**	,866**	,810**	,806**	,394**	,339**	,438**	,418**	,287**	,184*	0,043	,359**
		0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,011	0,557	0,000
OMXLAR-GEChange	,980**	1	,921**	,844**	,861**	,421**	,382**	,487**	,442**	,333**	,199**	0,033	,365**
	0,000		0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,006	0,652	0,000
OMXMIDChange	,866**	,921**	1	,915**	,828**	,386**	,386**	,452**	,404**	,372**	,154*	-0,002	,309**
	0,000	0,000		0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,033	0,975	0,000
OMXSMALL-Changes	,810**	,844**	,915**	1	,714**	,321**	,363**	,364**	,338**	,346**	0,130	0,057	,259**
	0,000	0,000	0,000		0,000	0,000	0,000	0,000	0,000	0,000	0,073	0,439	0,000
OMXStock-holmTechnology	,806**	,861**	,828**	,714**	1	,444**	,432**	,462**	,354**	,308**	,189**	0,074	,369**
	0,000	0,000	0,000	0,000		0,000	0,000	0,000	0,000	0,000	0,009	0,313	0,000
OMXHelsinki-Technology	,394**	,421**	,386**	,321**	,444**	1	,321**	,327**	,636**	,249**	,239**	,159*	,230**
	0,000	0,000	0,000	0,000	0,000		0,000	0,000	0,000	0,001	0,001	0,030	0,001
OMXCopenha-genTechnology	,339**	,382**	,386**	,363**	,432**	,321**	1	,293**	,308**	,544**	,185*	0,031	,389**
	0,000	0,000	0,000	0,000	0,000	0,000		0,000	0,000	0,000	0,011	0,670	0,000
OMXStock-holmRetail	,438**	,487**	,452**	,364**	,462**	,327**	,293**	1	,303**	,285**	,219**	-0,013	,230**
	0,000	0,000	0,000	0,000	0,000	0,000	0,000		0,000	0,000	0,002	0,855	0,001
OMXHelsinkiRe-tail	,418**	,442**	,404**	,338**	,354**	,636**	,308**	,303**	1	,277**	,181*	0,055	,144*
	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000		0,000	0,012	0,452	0,048
OMXCopenha-genRetail	,287**	,333**	,372**	,346**	,308**	,249**	,544**	,285**	,277**	1	0,137	0,092	,288**
	0,000	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,000		0,060	0,209	0,000
OMXStockholmE-nergy	,184*	,199**	,154*	0,130	,189**	,239**	,185*	,219**	,181*	0,137	1	0,050	,218**
	0,011	0,006	0,033	0,073	0,009	0,001	0,011	0,002	0,012	0,060		0,497	0,003
	0,043	0,033	-0,002	0,057	0,074	,159*	0,031	-0,013	0,055	0,092	0,050	1	0,043

DailyChangeO-MXHENERGY	0,557	0,652	0,975	0,439	0,313	0,030	0,670	0,855	0,452	0,209	0,497		0,563
OMXCopenha-genEnergy	,359**	,365**	,309**	,259**	,369**	,230**	,389**	,230**	,144*	,288**	,218**	0,043	1
	0,000	0,000	0,000	0,000	0,000	0,001	0,000	0,001	0,048	0,000	0,003	0,563	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 2 above shows the correlation coefficients between different indexes in the Nordic stock market. The indexes include data from OMXNORDIC40Change, OMXNLARGEChange, OMXMIDChange, OMXSMALLChanges, OMXStockholmTechnology, OMXHelsinkiTechnology, OMXCopenhagenTechnology, OMXStockholmRetail, OMXHelsinkiRetail, OMXCopenhagenRetail, OMXStockholmEnergy, DailyChangeOMXHENERGY, and OMXCopenhagenEnergy. However, the upper part of the table includes the indexes with abbrevations due to visual formatting. OMXN stands for OMX Nordic, OMXS for OMX Stockholm, OMXH for OMX Helsinki, OMXC for OMX Copenhagen. DRET stands for daily return, and letters R, T, and E mean; retail, technology, and energy.

The correlation coefficients are shown in the table as Pearson Correlation values, which indicate the strength and direction of the linear relationship between the two variables. A value of 1 indicates a perfect positive correlation, while a value of -1 indicates a perfect negative correlation. A value of 0 indicates no correlation.

Looking at the table, we can see that there is a strong positive correlation between OMXNORDIC40Change and OMXLARGEChange, with a Pearson correlation coefficient of 0.980. There is also a strong positive correlation between OMXNORDIC40Change and OMXNMIDChange, with a coefficient of 0.866, and between OMXNORDIC40Change and OMXSMALLChanges, with a coefficient of 0.810.

In addition, there is a positive correlation between OMXNORDIC40Change and some of the technology indexes, such as OMXStockholmTechnology (0.394), OMXHelsinkiTechnology (0.339), and OMXCopenhagenTechnology (0.438). There is also a positive correlation between OMXNORDIC40Change and OMXStockholmRetail (0.418) and OMXHelsinkiRetail (0.287).

On the other hand, there is a weak positive correlation between OMXNORDIC40Change and OMXStockholmEnergy (0.184) and a weak negative correlation between OMXNORDIC40Change and DailyChangeOMXHENERGY (-0.043).

Overall, the table suggests that the Nordic stock market indexes are positively correlated with each other, with the OMXNORDIC40 indexes being strongly correlated with the large-cap and mid-cap indexes, as well as with some technology and retail indexes. This can further emphasize the hypotheses that the Russia-Ukraine war effects do indeed reach the whole of Nordic. However,

there were some outliers in correlational statistics as well like seen above especially among the Finnish indexes. Especially the weak negative correlation between OMXNordic 40 and OMXH energy can be argued to be due to Behavioural factors and hence arguing with the efficient market theory. However, the correlation between the OMXNORDIC40 indexes and the energy indexes is weaker, which can be expected since energy is one of the main resources provided from Russia.

5. Conclusion and discussion

The final chapter goes through summarizing and explaining the answers to specified research questions and assesses the standard and validity of the research paper. This process is done to emphasize the relationship between the results and theoretical side of the research. Limitations of this study as well as future suggestions for similar studies will be discussed at the end of the chapter.

5.1 Answering the research questions

The data provided was able to answer the set research questions in the beginning of the thesis, after analyzing the datasets within SPSS and excel. Effects of the Ukraine-Russia war on Finnish stock markets were tested on this study as well as its impact on the neighboring Nordic countries. Additionally, each hypothesis was supported by the results. Chosen sectors Retail, Technology, and Energy were also measured and tested to match the research question of "which of the chosen sectors had the biggest and weakest correlations amidst the war?

5.1.1 Research question 1

1. RQ1 – How did the Ukraine-Russia war affect the performance of the Finnish stock market indexes', such as OMX Helsinki, in terms of returns compared to its Nordic neighbors?

H1 The Russia-Ukraine war had a more significant impact on the Finnish market compared to other Nordic countries due to it being a neighbour to Russia, hence creating behavioural biases.

The findings made show a clear link that, based on the analysis of the dataset, it was found that the impact of the findings had a slightly larger effect on the Finnish OMX indexes compared to the other indexes. While all the indexes showed a significant change in their returns after the findings were announced, the Finnish OMX indexes exhibited a larger magnitude of change. This may suggest that the findings had a more significant impact on the Finnish market or that the market participants in Finland were more responsive to the information.

Additionally Finnish market was less efficient or more susceptible to behavioral biases than the other markets in the dataset further emphasizing that behavioral finance is present during times of crisis. However, more research is needed to specify these conclusions. Overall, the Research question and hypothesis were in line with expectations aside from behavioral finance measurements but none the less provided useful data for further research.

5.1.2 Research question 2

2. RQ2 What is the magnitude and direction of the correlations among the Nordic stock indexes within the retail, energy, and technology sectors during war of Russia and Ukraine, and what factors may explain the strength or weakness of these correlations?

H2 The influence of the war with Russia and Ukraine on Nordic stock markets varies by sector, with the retail and technology sectors experiencing the strongest positive correlation to the war and the energy sector exhibiting weaker or negative correlations.

H3 The correlation between the energy and other sectors is either negative or weaker.

In line with Geopolitical risks and theories provided by (Kanniainen & Yue, 2019), wars have significant emphasis on certain sectors based of the magnitude and type of militaria event. Previous assessment of spillover effect during wars is also valid on this research question since it has been established that all the Nordic countries experienced negative effects from the invasion. This also established that the accessed literature from (Kanniainen & Yue, 2019) which suggested that smaller marketplaces have a strong reaction to geopolitical events was correct. Based on the results direction and correlation were stronger in retail and technology.

These factors could be explained through consumers trying to find the sector with the highest returns during a time of crisis. This statement can be backed with behavioral finance studies and historical war event studies in the literature review section. Hypothesis number two further emphasized the importance of energy and its negative correlations which was found to be true through the datasets. Hypotheses number three was not in line with expectations, since the energy sector had a small positive correlation with the OMXNordic 40 index. However, in the accessed literature (Bertelsen & Sedlacek, 2014) does claim that Energy sector moves in line with large scale companies.

5.2 Limitations and suggestions for future research

There are multiple limitations to the research conducted for this thesis, which provide hints for studies in the future. The focus of this study was the thirteen different indexes and three different sectors, within the Nordic region and examining their daily returns through descriptive and correlational statistics, amidst Russia-Ukraine war. To provide a larger set of results variables could be increased and other than publicly listed companies could be studies.

The author also provided certain limitations during the research, one being the limited answer towards behavioral finance due to its measurement difficulty without large institutional measurement tools. Another limitation was the fact that since the war is ongoing, final sample size and dates were unable to be analyzed. In future research a larger set of sample sizes can be utilized which might draw different conclusions statistically.

Suggestions for future research include examining the impact of other geopolitical events on Nordic stock markets, examining causality between geopolitical events and Nordic stock markets, and expanding the analysis to include other sectors and countries in the Nordic region. Since the author only used stock returns, other features such as volume, volatility meters, and other stock market related metrics could be utilized within future research for more in-depth analysis.

Furthermore, future research could examine the impact of the Ukraine-Russia war on individual companies within the Nordic stock markets to provide a more in-depth understanding of how the war affected individual firms.

Case studies on individual companies with large exposure towards Russia could further increase the knowledge of this phenomena. Lastly, future research could examine the impact of the Ukraine-Russia war on the Nordic bond markets to provide a more comprehensive understanding of how the war affected the overall Nordic financial market and not only the stock market.

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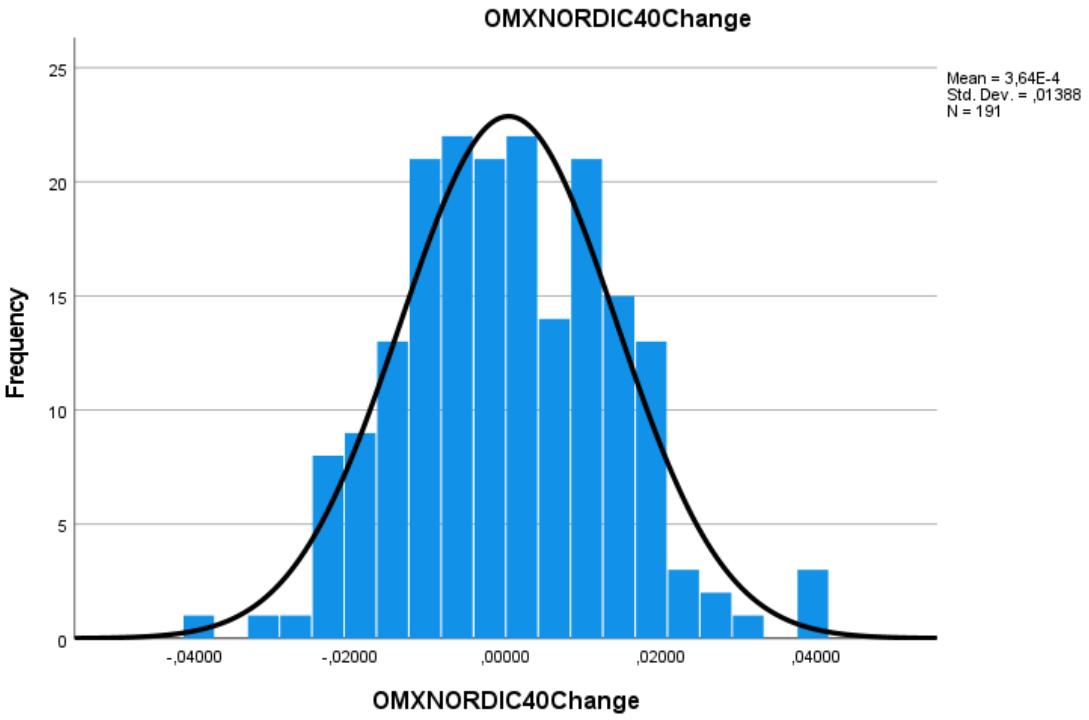
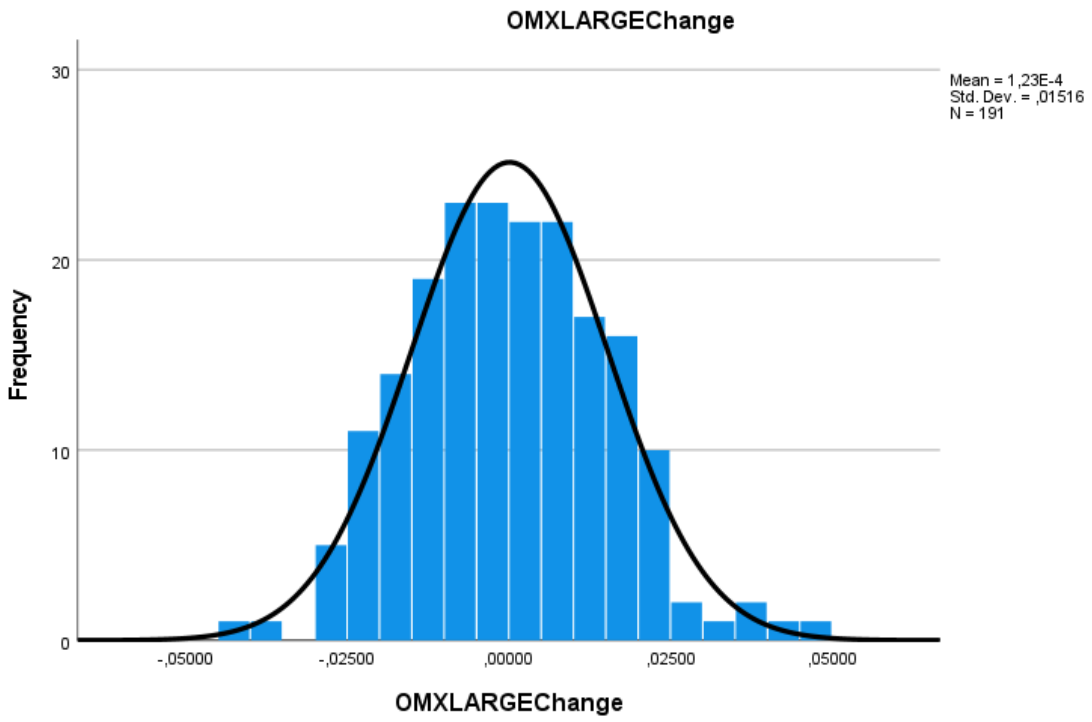
Appendices

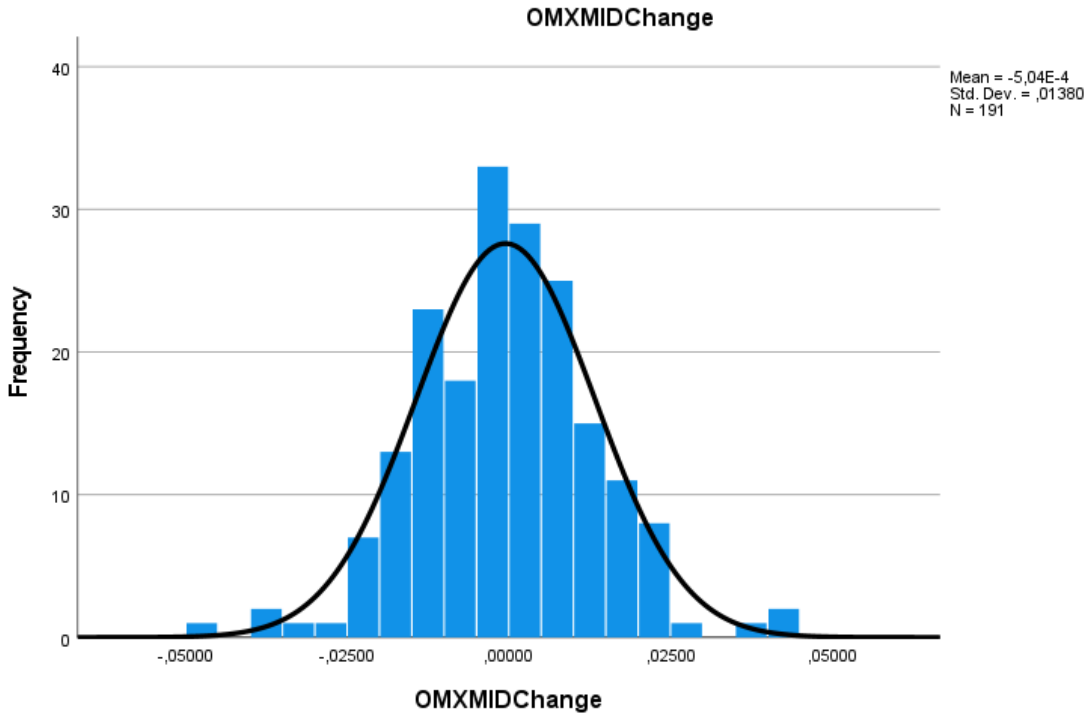
Appendix 1. Distribution of OMXNORDIC40CHANGE


OMXNORDIC40Change
Mean = 3,64E-4
Std. Dev. = ,01388
N = 191
Frequency
25
20
15
10
5
0
-,04000
-,02000
,00000
,02000
,04000
OMXNORDIC40Change

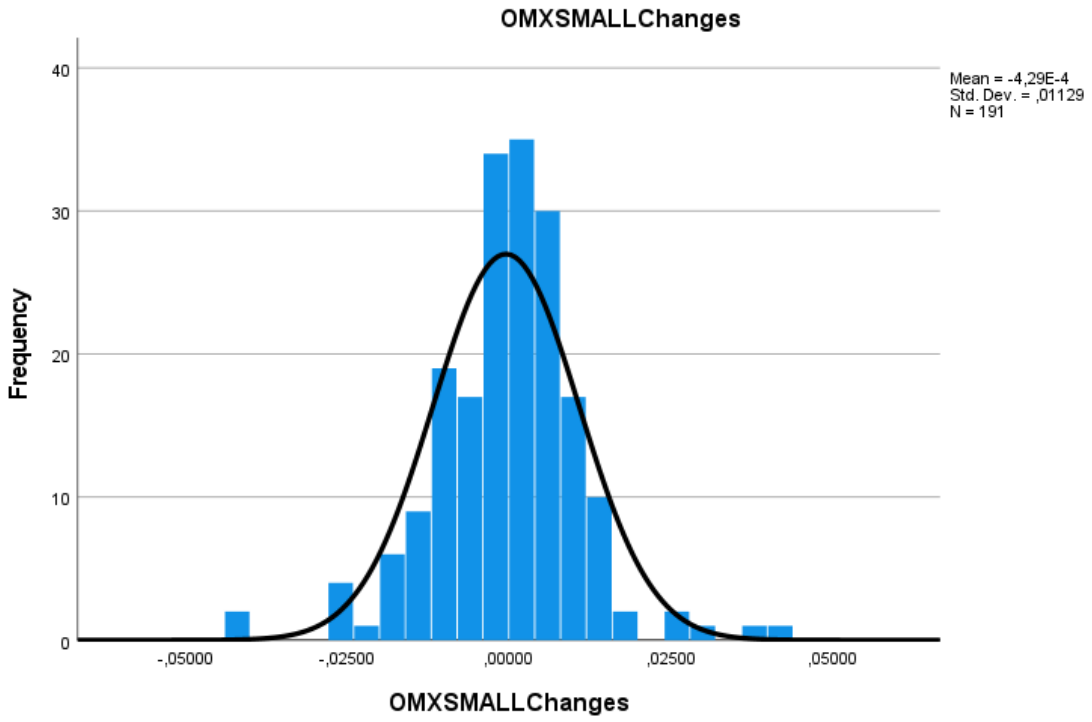
Appendix 2. Distribution of OMXLargeChange



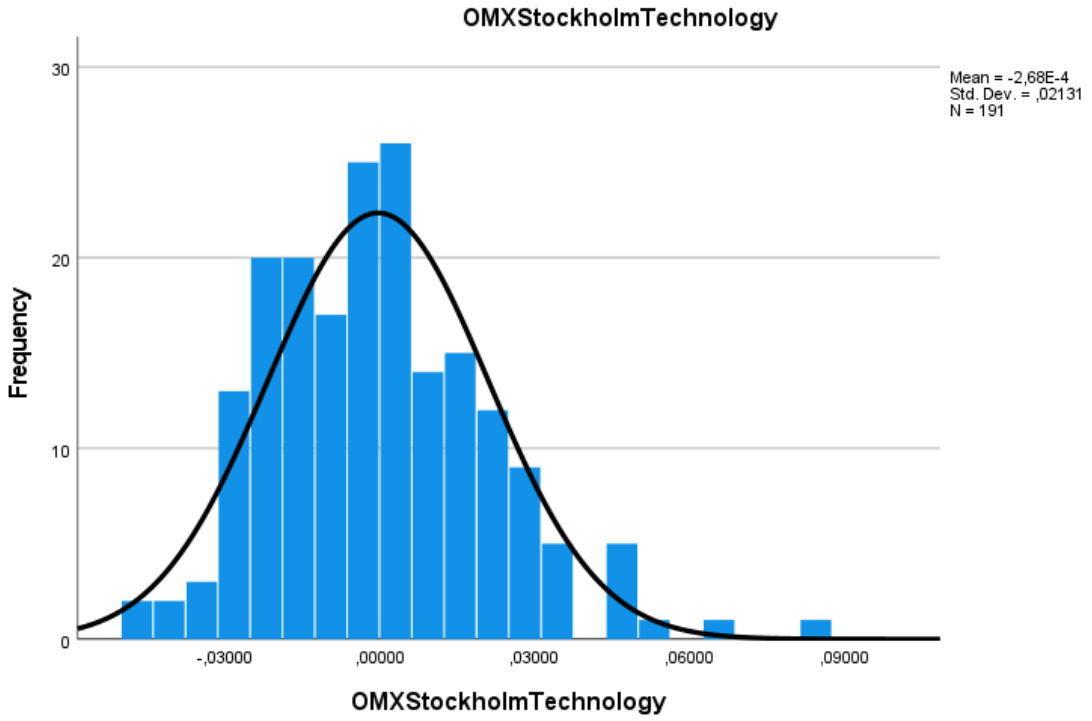
Appendix 3. Distribution of OMXMIDChange



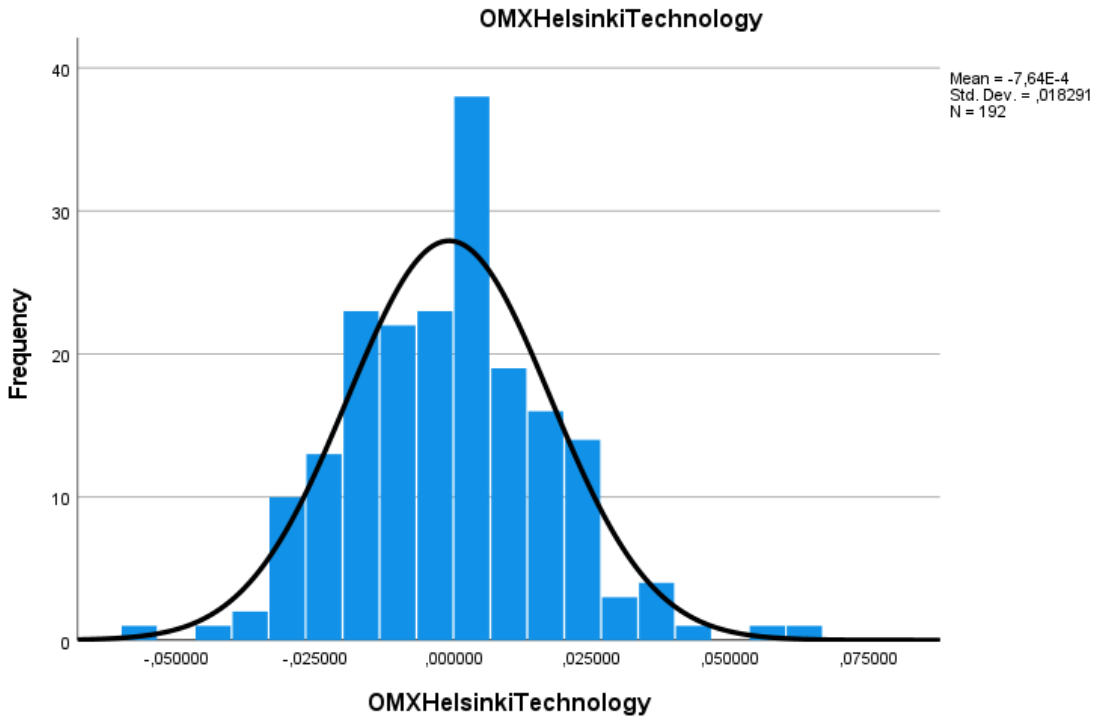
Appendix 4. Distribution of OMXSMALLChanges



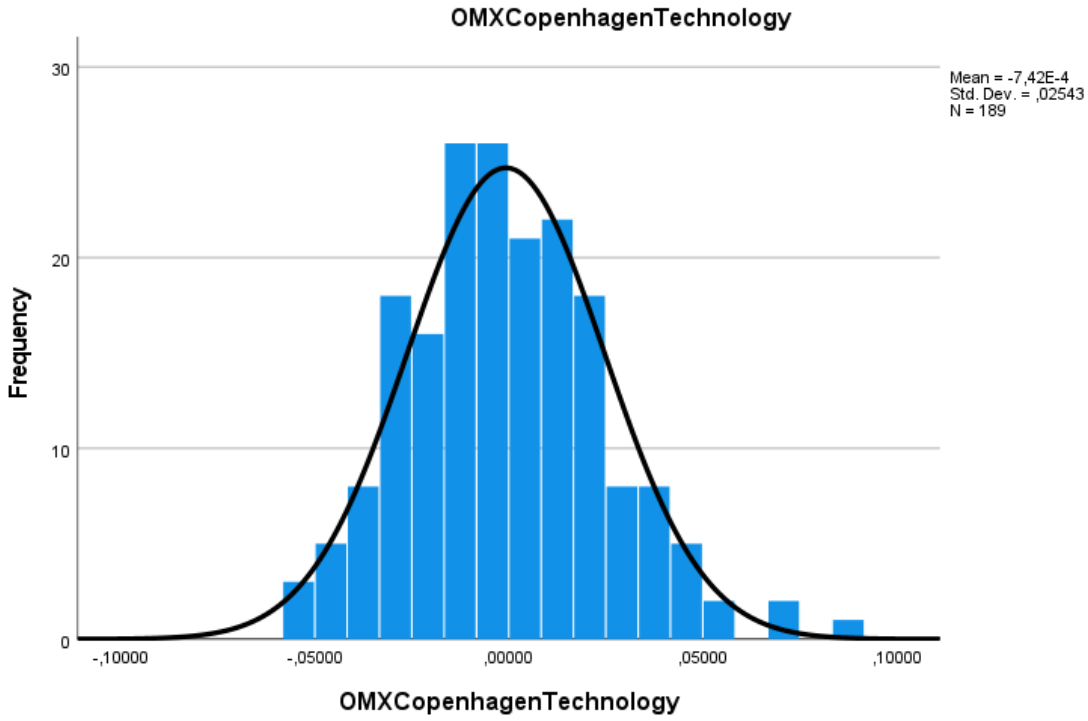
Appendix 5. Distribution of OMXStockholmTechnology



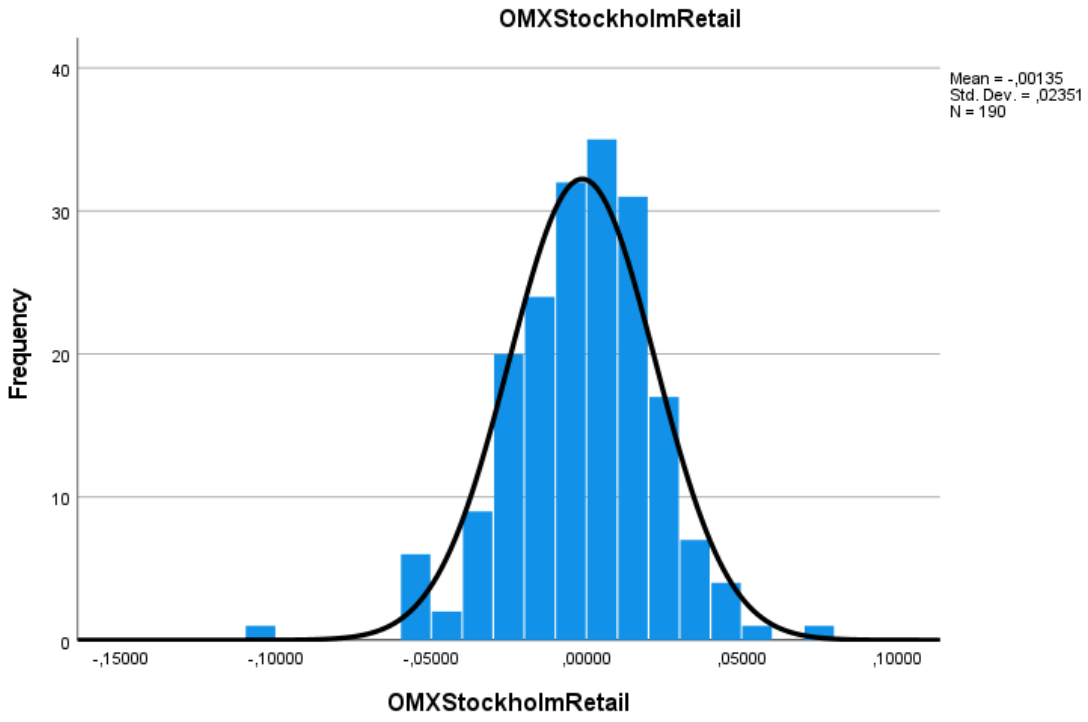
Appendix 6. Distribution of OMXHelsinkiTechnology



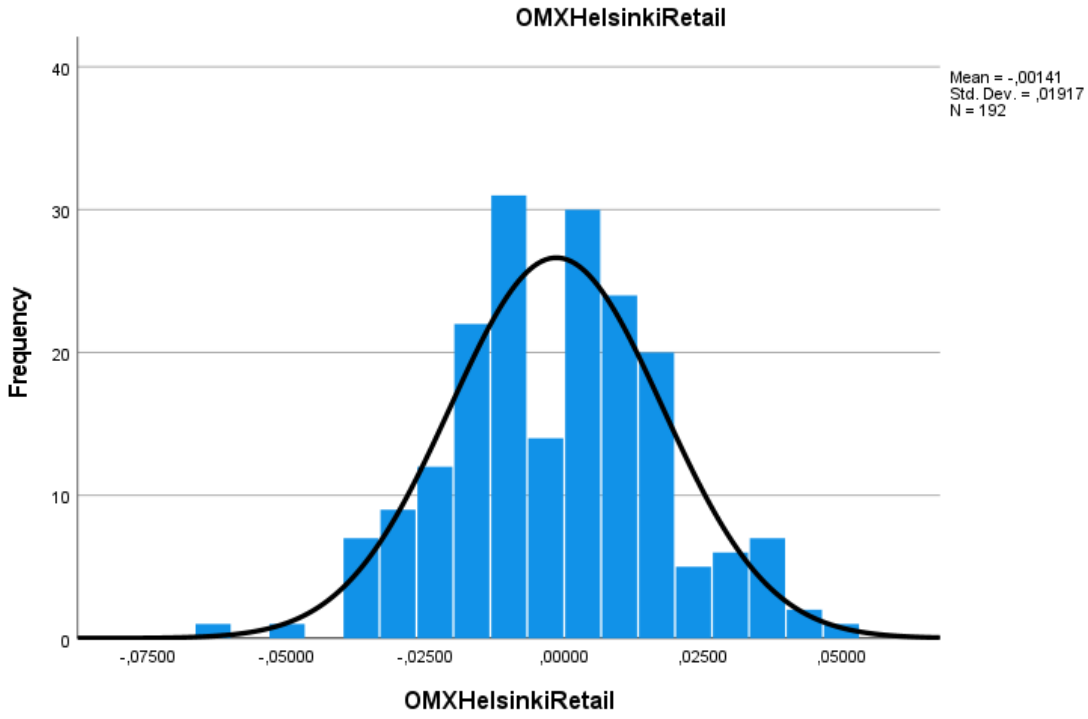
Appendix 7. Distribution of OMXCopenhagenTechnology



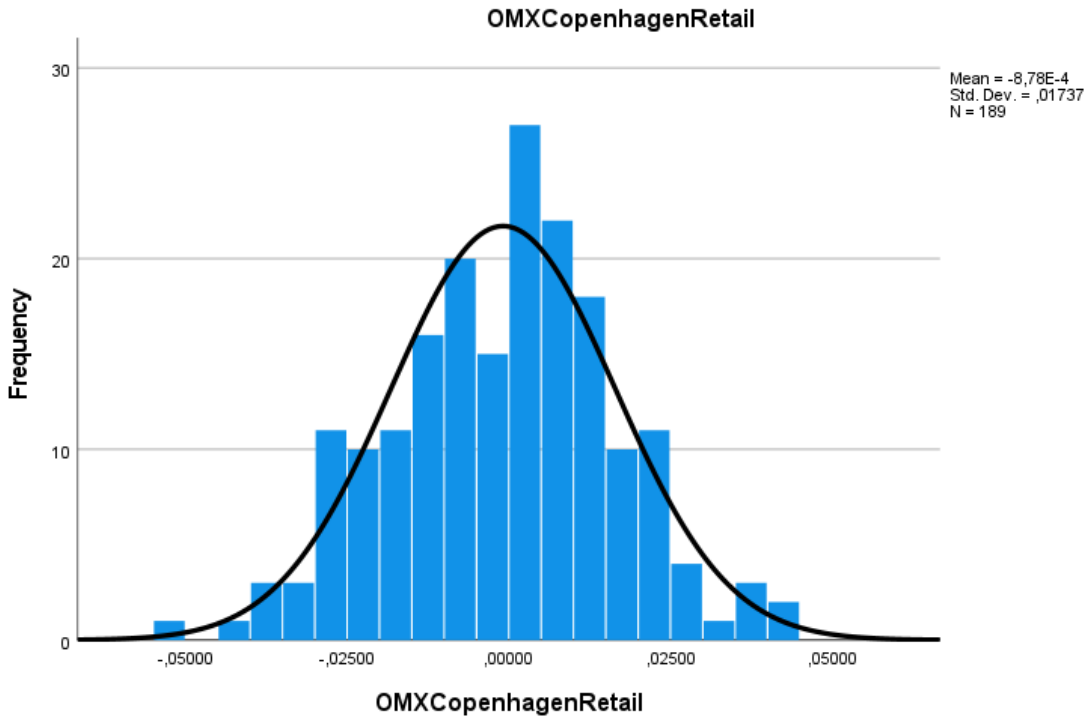
Appendix 8. Distribution of OMXStockholmRetail



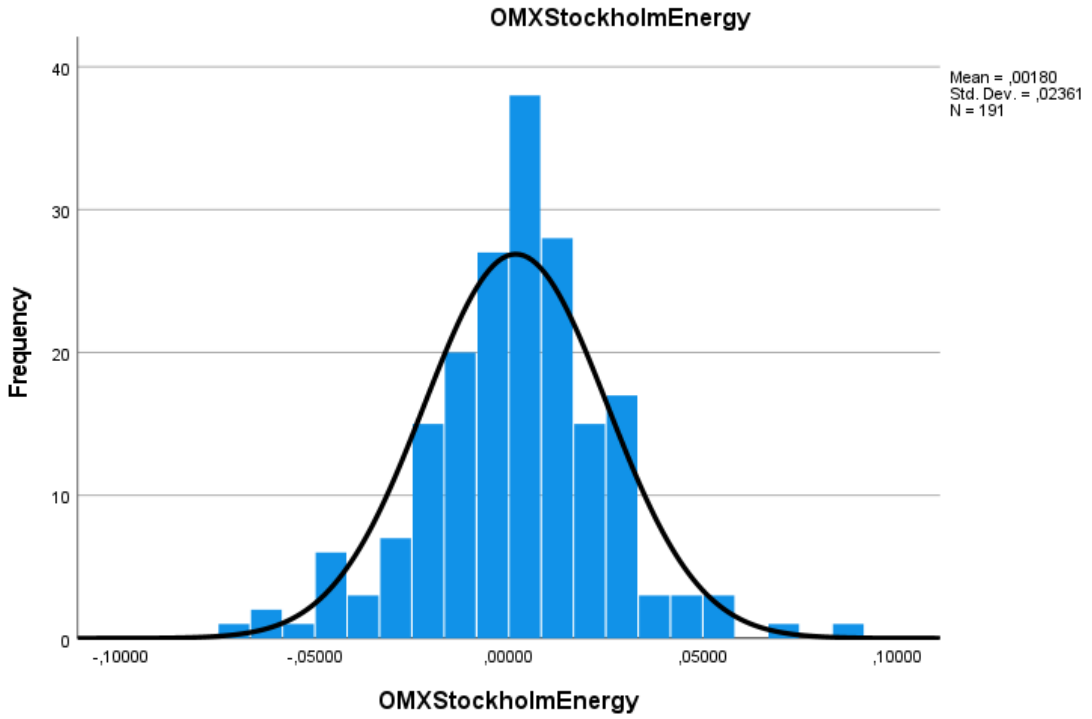
Appendix 9. Distribution of OMXHelsinkiRetail



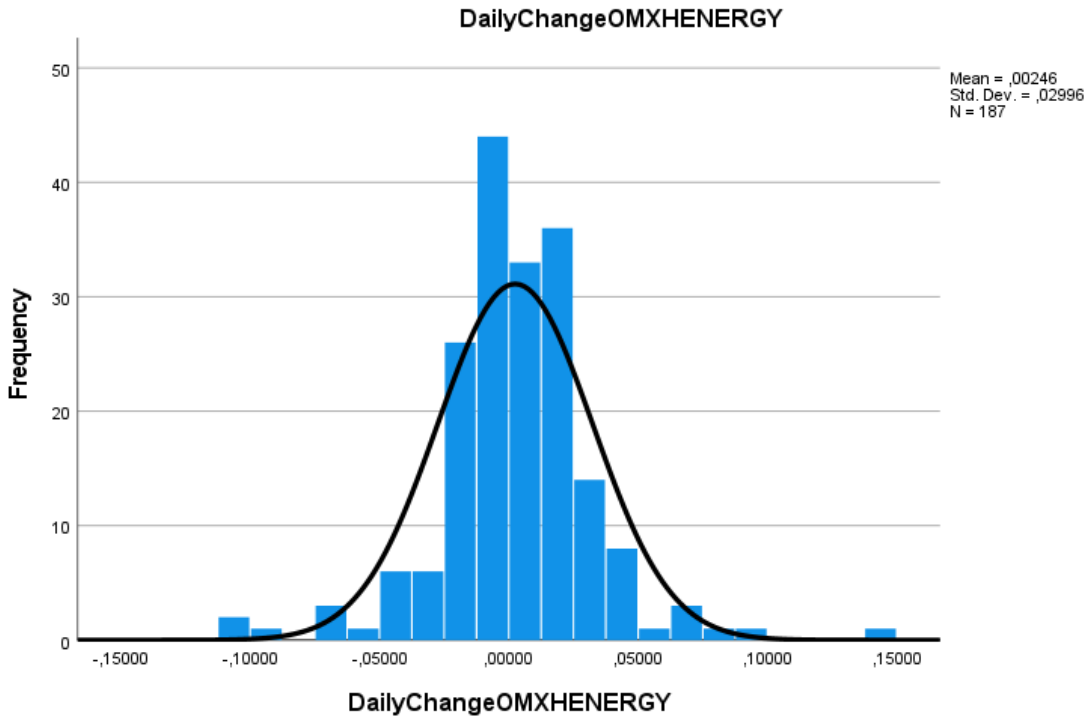
Appendix 10. Distribution of OMXCopenhagenRetail



Appendix 11. Distribution of OMXStockholmEnergy



Appendix 12. Distribution of DailyChangeOMXHENERGY



Appendix 13. Distribution of OMXCopenhagenEnergy