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Effects of the US-China Trade War on Finnish and Swedish Large Cap Basic Materials Stocks

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ABSTRACT

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This thesis investigates the short-term stock price reaction to the US-China trade war events in the Finnish and Swedish stock markets. In this study only large cap basic materials stocks are studied. The date consists of 32 events that relate to the US-China trade war and its actions from August 2017 to December 2018. In total 12 stocks from Finnish and Swedish stock market are studied. This thesis also studies company and market level differences on reaction to the US-China trade war events. Event study methodology is used to investigate the stock price reactions.

The results show that investors tend to react negatively to US-China trade war related events. This indicates that they lower their future earnings expectations of basic materials stocks. The 5-day and 10-day post-event CAARs are -1,00% and -0,95%. The 21-day event window cumulative average abnormal returns are -0,52%. The main findings of this study are that in general US-China trade war events have had varying results on Finnish and Swedish basic materials stocks. The results indicate that there are differences between Finnish and Swedish stock markets and also on company level. The results also show that company level reactions to the US-China trade war events vary from positive to negative.

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Tämä tutkimus tutkii lyhyen aikavälin markkinareaktiota USA-Kiina kauppasodan tapahtumiin Suomen ja Ruotsin osakemarkkinoilla. Tässä tutkimuksessa tutkitaan ainoastaan suuria raaka-aine sidonnaisia osakkeita. Aineisto koostuu 32 tapahtumasta, jotka liittyvät USA-Kiina kauppasotaan ja sen toimiin elokuusta 2017 joulukuuhun 2018. Yhteensä 12 suomalaista ja ruotsalaista osaketta valittiin tutkimukseen. Tässä tutkimuksessa tutkitaan lisäksi osakemarkkinoiden ja osakkeiden välisiä eroavaisuuksia markkinareaktioissa. Tutkimusmenetelmänä käytetään tapahtumatutkimusta.

Tulokset osoittavat, että sijoittajat reagoivat negatiivisesti USA-Kiina kauppasotaan liittyviin tapahtumiin ja uutisiin, mikä indikoi heidän alentavan tuotto-odotuksiaan raaka-aine sidonnaisten osakkeiden kohdalla. Viiden ja kymmenen päivän tapahtuman jälkeiset kumulatiiviset keskimääräiset epänormaalit tuotot ovat -1,00% ja -0,95%. Tapahtumaikkunan kumulatiiviset keskimääräiset epänormaalit tuotot -0,52%. Tutkimuksen tulosten perusteella voidaan todeta, että markkinareaktiot USA-Kiina kauppasodan tapahtumiin vaihtelevat Suomen ja Ruotsin välillä. Tulokset myös osoittavat, että reaktiot vaihtelevat osakkeiden välillä negatiivisesta positiiviseen.

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Helsinki, 23th of August, 2020
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1. INTRODUCTION

The analysis of major market moving news events during the last two decades has formed an own field of research in finance studies. A major increase in the understanding of how market information results in asset reactions has led to development in academic research and event study literature. However, the ongoing debate about announcements effects amongst scientists and practitioners about market-moving news in media reports indicates that there is a demand for a more clear understanding of announcements effects on markets. Market commentators often argue that the European stock market movements on specific trading days happen because of the US announcements, it is important to study this topic more. (Rühl and Stein 2014)

China and the United States are the two biggest economies in the world. Both countries are large both in GDP and also when it comes to international trade and foreign direct investments. The relationship between China and the US has a major impact on their economies, but also on the world economy and global trading. The impacts can be seen on global supply chains of production. In early 2018 these two countries ended up into a trade war, which is the largest in the global market in the past half a century. According to Qiu, Zhan and Wei the relationship between the US and China has become more competitive after the 2008 global financial crisis. This has been clear especially in the Trump-Xi era. (Qiu, Zhan & Wei 2019)

According to Lawrence (2019), President Donald Trump's views on trade are completely different compared to most economists as well as former US administrations. President Donald Trump seems to view trade as a zero-sum game in which some win and some lose. Trade war and its actions between the US and China have also violated many practices and rules of the trading system established under the General Agreement on Tariffs and Trade (GATT) and its follower the World Trade Organization (WTO). (Lawrence 2019)

European Union is the biggest exporter of fuels, mining products, iron and steel. These products are 17% of world exports. (World Trade Organization, 2018) When combining information from research papers of Lawrence (2019) and Qiu, Zhan & Wei (2019) to

WTO's statistics, it becomes interesting to study Finnish and Swedish stocks that are bound to raw materials in this study.

The US-China trade war and its effects have been studied from different perspectives. For example, Huang, Lin, Lin and Tang (2019) studied trade linkages and firm value during the US-China trade war. Qiu, Zhan and Wei (2019) investigated the US-China trade war from the trade literature point of view. Fendel, Burggraf and Huynh (2019) analyzed Donald Trump's tweets related to the US-China trade war. They investigated the impact of political news on stock price movements. Most of the previous studies are focusing on the US or Chinese market. European market and Nordic markets lack event study literature about this topic.

To the best of my knowledge there are no studies that investigate the US-China trade war and its effects on Finnish and Swedish stock markets. When combining all the information mentioned above, it becomes interesting to study the US-China trade war from Finnish and Swedish stock markets point of view. This research fills the research gap for Finnish and Swedish markets and more specifically basic materials stocks point of view.

1.1 Objectives of the study and limitations

The main objective of this study is to figure out the effects of the US-China trade war on Finnish and Swedish large cap materials stocks. This research will investigate if events related to the US-China trade war caused abnormal returns on basic materials stocks and were they positive or negative to firms' value. This study will also focus on differences in reaction to US/China trade war events between studied basic materials stocks.

Rühl and Stein (2014) studied these topics in their research and found out that it is important to investigate the relationship between US macroeconomic news and European stocks. Also, stock-specific results should be included into studies. In this research both matters are considered and studied.

The data that is used in this study is from November 2016 to January 2019. This period of time contains all of the estimation windows and event windows. All of the event dates happened between September 2017 to December 2018. Studied events related to the US-China trade war are limited to the end of 2018. This means that the results of this study are valid only for this specific time period. It is also notable that long-term results are not studied, which lowers the reliability of this study. Stocks that were analyzed are listed in Helsinki and Stockholm stock exchanges. These results cannot be used for other stock markets as they are presented in this study. Only large cap basic materials stocks were studied. Categories from Nasdaq were used to choose specific stocks. Also, only the most traded stock type for each company was used in this study. Also, limitations were made to stocks based on listing to stock exchanges. Stocks that had listing after the first studied event's estimation window started, were left out of this research.

This study was limited to basic materials stocks because many of the political actions and tariffs related to the US-China trade war were directed to basic materials. The Stoxx 600 index was used to analyze the market reaction to political actions of the US-China trade war. Euribor 12-month rate was used as a risk-free interest rate. After these limitations 32 event dates and 12 stocks were studied. In total 384 observations were studied in this research.

1.2 Research questions

According to previous literature, it is possible that there are abnormal returns that are related to US-China trade war events. Huang et. al. (2019) studied market reactions on 2018 US-China trade war events and found out that market returns varied between companies. They also found out that trade intensity between China had a major effect on stocks' reaction to US-China trade war events. Fendel et. al. (2019) found out that President Donald Trump's tweets related to the US-China trade war negatively predicted S&P 500 returns. They had similar findings about the stocks trade intensity degree with China and its effects on stock reaction. Generally speaking, various studies have shown that trade policy related announcements have an effect on stocks value. Rühl and Stein, (2014), Crowley, Meng & Song, (2018), Breinlich (2015).

Considering previous research papers of these topics and lack of research about the US-China trade war on Finnish and Swedish stock markets, there are three research questions in this study.

1: Does US-China trade war events statistically significant effects on Finnish and Swedish large cap basic materials sector stocks?

2: Is there difference between Finnish and Swedish markets on reaction to trade war events?

3: Is there difference between large cap basic materials stocks on reaction to trade war events?

All these research questions will be investigated in the empirical part of this research. Empirical results will be presented in chapter five.

1.3 Structure of the study

This thesis consists of six chapters. The first chapter introduces the topic and research questions of the thesis. Chapter two presents the theoretical background of the study and introduces main theories that this research relies on. The US-China economic relationship and its history will be presented. Chapter two also represents the timeline and main events of the US-China trade war. After that theory of efficient capital markets and concept of basic materials stocks will be discussed.

In chapter three previous literature of the topic is presented from different aspects. Third chapter includes also previous studies about US-China trade war and event studies related to the topic. Chapter four presents the methodologies that are used in this research. Event study research process will be presented. Also, formulas used in empirical research are introduced. Most of the theories and practices in this chapter rely on MacKinley's theories about event studies. Event study history and event study

methodology in economics and finance will be also introduced. This chapter also includes more information about the data and its features that are used in this research. Fifth chapter presents empirical results and tests implemented in this research. Finally, the last chapter focuses on conclusions of the study and gives answers to research questions. Also, further research topics are discussed in the sixth chapter.

2. THEORETICAL BACKGROUND

Chapter two presents theoretical background to the study. In this chapter different topics related to this research will be discussed. It is important to understand the background behind US-China economic relations and US-China economic history will be shortly presented in chapter two. Actions and events that led to the US-China trade war will be declared. Also trade policies of both countries will be discussed. Theoretical approach to an efficient capital market will be also discussed at the end of this chapter. Finally, the concept of basic material stocks and their special characteristics will be shortly introduced.

2.1 US-China economic relationship

The US-China economic relationship used to be more interdependent and had more collaboration than it has today. In the late 1990s the US and China had a collaborative relationship in the world economy, where the US consumed China's relatively cheap exports and paid China using the US dollars. China held US dollars and treasury bonds and provided loans to the US. There were reasons behind the symbiotic relationship between the US and China. (Wang & Zeng 2020)

In the international monetary system, the US dollar has always been the currency with dominant position. This offered the US several advantages. The US had the ability to issue dollars as the world trading and reserve currency. There was also demand for US government bonds because foreign official institutions were willing to purchase them. Also, the US had privilege to run balance-of-payment deficits without doing structural adjustments. This is what other borrowing counties had to do. The United States also had discretion of the Federal Reserve, which helped to implement expansionary monetary policy. Under the circumstances, it was possible for the US to consume more than they produced. (Wang & Zeng 2020) This has generated persistent trade deficits in goods since 1975. Also, its share of GDP continued to rise before 2000. US trade in services has maintained a long-term surplus. (Jiming & Yangmei 2019)

Since reform and opening-up policy of Deng Xiaoping in the 1980s and by following the steps of Japan and many other newly industrialized countries, China has stimulated export-focused growth. (Wang & Zeng 2020) China's growth was driven by two sets of factors. First, China had a market -oriented policy that reformed prices. China also supported actions to build a good environment for foreign direct investments and business. This approach supported China's fast capital accumulation and export-oriented growing after the 1980s. Second, China had economic fundamentals that supported rapid growth. China's supportive demographic factors and low level of labor costs had a major impact on fast growth. (Wei et. al. 2017)

During the 1990s reforms for the township and village enterprises and of the state-owned business sector were released. This was the largest privatization program in the world when it comes to of numbers of workers who moved from state-sector to private-business employment. The township and village enterprise sector had almost vanished by 2011 There was nearly five-fold increase of private enterprises to about 17 million from 1995 to 2014. (Wei et. al. 2017) Between 1994 to 2005 China maintained a fixed exchange rate against the US dollar. Between 2005 to 2008 China had very limited appreciation and flexibility in the RMB exchange rate. (Wang & Zeng 2020) Through this period of time the growth of Chinese economy was highly driven by these factors. Foreign direct investments rose rapidly in China since 1992. (Wei et. al. 2017) Foreign direct investments benefitted Chinese economy in many ways. Foreign investments gave China access to innovative technology, modern management practices, employment and especially connection to global supply chains. Chinese industrial policies had moved towards less regulations related to FDIs since the 1980s. Most recently at the Boao Forum, April 2018, president Xi Jinping promised foreign firms' better access to China's market. This event is also studied in this research. (Lovely & Huang 2019)

After China joined WTO in 2001, Chinese products were particularly competitive in the market because of the low-level exchange rate and availability of cheap manufacturing. (Wang & Zeng 2020) China's trade increased rapidly and the GDP of China were estimated to double once every seven years. China's export value in US dollars doubled once every four years. By 2004, China had become known as a "World's factory", because of its trade volume and sector coverage. (Wei et. al. 2017) This

created massive trade surpluses. China’s trade surplus and strong economic growth gave the central bank of China pressure to appreciate currency and engage in interventions. China’s central bank sold RMB and bought dollars in the foreign exchange market, which resulted to growth of China’s foreign exchange reserves. US balance-of-payment deficits were financed by some of these foreign reserves of China. (Wang & Zeng 2020)

China has also become an important supplier of components for the United States and other countries. China’s exports of components amounted to only about 60 percent of the amount of imports of components in the early 1990s. This share continued to rise during the ensuing years. In 2013-2014, exports of components exceeded imports by 25 per cent. This tells that China's role in global production sharing has deepened over the past decades. (Athukorola 2017)

The financial crisis in 2008 marked a critical turning point in the US-China economic relations. After that the economic relation between the US and China had been more competitive, notably in the Trump-Xi era. The financial crisis had a large negative effect on Chinese exports and relieved the harmful side of export-oriented economic growth model China was using. During 2009 to 2012 China was led by Hu and Wen. During these years Chinese leaders recognized the negative effects of dependence of the US dollar and the foreign market. They prioritized growth and stability and had a goal that China would be less reliant on the US market. (Wang & Zeng 2020) China largely maintained its trade balance after the financial crisis, although China’s account surplus declined from 10 percent of GDP in 2007 to 1,4 percent in 2017. China maintained a surplus of trade in goods for several years, but it ran a deficit in services trade. (Jiming & Yangmei 2019)

On 19 May 2015 China’s State Council released a plan called “Made in China 2025”. The plan contained ten key sectors for China’s innovation-driven development. “Made in China 2025” focused on steering China’s labor-intensive industries towards high-tech manufacturing. The main goal behind this plan was that China would become a global leader in innovation. When the Trump administration released the 2017 US National Security Strategy in December 2017 it was clear that the US strategy was also becoming more competitive. (Wang & Zeng 2020)

According to Liu and Woo (2018) there were three major factors that lead the United States and China into the trade war. First factor related to China's large trade surplus that was challenging job creation in the United States. This concern was based on the fact that companies in the United States displaced labor by imports from China. Second concern was that China was using outlawed actions to acquire technology from the United States for a clearly cheaper price. Third concern was related to US national security and believe that China tried to weaken it and its global standing. (Liu & Woo 2018)

In general, there has been no decline in The US economy when it comes to absolute or relative measures. Since the end of the Cold War the economy of the United States has grown faster than any other of the industrialized economies. Also, the margin over European economies and Japan has grown in terms of total GDP and income per capita. The main factor explaining any US decline measured in relative terms is in China's strong rise in efficiency. (Bergsten 2019)

The United States and China are currently equal on many key metrics. GDP in purchasing power parity (PPP) and level of trade are examples of these key metrics. China's GDP passed the United States in 2010 when measured in PPP terms. It is estimated that China's GDP will continue to grow for at least the next decade for double or triple the US rate. At this rate China's GDP in terms of PPP will be double as the US level by 2030. Also, the trade level of China will possibly double the US level by 2030. (Bergsten 2019)

2.2 Timeline of the US-China trade war

In August 2017 President Donald Trump signed an executive memo making US Trade Representative Robert E. Lighthizer to begin the new investigation on China's illegal trade practices. This memo was named Section 301 Investigation. (US Trade Representative 2017) This event date is the first event studied in this research.

In January 2018, the United States began imposing tariffs on imported goods. First these tariffs were only imposed on washing machines and solar panels. These tariffs were approved to be up to 50 percent on solar panels and 30 percent on washing machines. The second round of tariffs were set on March 1, 2018 when President Donald Trump announced imposition of 25% tariffs on imported steel products and 10% on imported aluminum. (Havráneková 2019) On March 22, the US announced tariffs worth $50 billion of Chinese goods. This time the action was targeted at the "Made in China 2025" plan. On March 23, Chinese government announced a list of 128 US goods that would face tariffs. (Huang et. al. 2018)

On April 2, 2018 the Ministry of Commerce of China announced tariffs on the 128 products that they proposed earlier on March 23, 2018. The following day the US published a proposed list of Chinese goods that would be facing tariffs based on the Section 30 Investigation. On April 8, 2018 at the Boao Asia Forum President Xi announced that China will expand market access and actively increase imports. Couple of days after President Trump ordered top officials to investigate the possibility of joining the Trans-Pacific-Partnership (TPP). Shortly after on April 16, 2018 the US Commerce Department limited American companies from selling parts, components, and software to Chinese ZTE Corp. (Huang et. al. 2018)

On May 20, 2018 US Treasury Secretary Steven Mnuchin released a pause in the trade war. On May 29, about a week after that announcement, the Trump administration published that it would go further with its proposal from March 3, 2018. Behind that proposed list of products was Section 301 Investigation. (Huang et. al. 2018)

On June 15, President Donald Trump stated that the United States would impose a tariff on products imported from China. This time the tariff was 25% on $50 billion worth of imports. The list of goods to be tariffed consisted of 279 goods categories. (Havráneková 2019) On June 18, Trump directed the USTR to investigate $200 billion worth of Chinese goods that would face additional tariffs at a 10 percent rate. (Huang et. al. 2018)

On July 6, 2018 US tariffs on Chinese goods worth $34 billion in imports began. Shortly after that on July 10, 2018 a list of $200 billion worth of additional products was published by the Trump administration. This list included over 6000 items with tariffs at a level of 10% to 25% depending on imported goods. (Huang et. al. 2018)

On August 2, 2018, the USTR states that it will increase the tariff rate from 10 to 25 percent for the list released on July 10. The day after that, China hit back. China decided to impose tariffs of 5 to 25 percent on US goods worth about $60 billion. The USTR announced on August 7, that it will impose a 25 percent tariff on $16 billion of goods starting from August 23. Also, this time China hit back the following day and decided to impose a 25 percent tariff on US $16 billion worth of imports when the Trump administration tariffs go into effect on August 23. (Huang et. al. 2018)

September 6, 2018 was probably one of the most crucial points in the trade war, when President Donald Trump announced that there is another set of tariffs ready. That set would be $267 billion worth of tariffs. (Havráneková 2019) September 17, 2018 The United States finalized tariffs on $200 billion worth of Chinese goods that were planned to be on effect on September 24, 2018. The following day China announced that it will implement tariffs worth $60 billion for US products that would go into effect also on September 24, 2018. After that China also cancelled trade talks planned with the US on September 22, 2018. As planned, both countries implemented a third round of tariffs on September 24, 2018. (Wong & Koty 2018)

After weeks of silence, US and Chinese officials resumed contact on October 25, 2018 to prepare a meeting for presidents Trump and Xi for the G20 meeting in Argentina. On October 30, 2018 US reportedly prepared to announce more tariffs on Chinese products if a meeting between presidents at the G20 in Buenos Aires is not successful. (Wong & Koty 2018)

On November 9, 2018, the United States and China resumed trade talks between US Trade Secretary Steve Mnuchin and Chinese Vice Premier Liu He. A list of proposed export controls that were focusing on emerging technologies was published on November 19, 2018. (Wong & Koty 2018)

December 1, 2018 the United States and China agree to a temporary truce at the G20 Summit in Buenos Aires. Both countries agreed to not increase or impose more tariffs for 90 days. On December 14, 2018 China lowered tariffs on US auto parts for three months beginning from January 1, 2019. China also resumed its purchases of US-soybeans. (Wong & Koty 2018)

2.3 Efficient capital markets

The background of the Efficient Markets Hypothesis (EMH) can be set back to the pioneering theoretical contributions of Bachelier (1900) and the empirical studies of Cowles (1933). The modern literature in economics starts with Samuelson (1965) and article “Proof that Properly Anticipated Prices Fluctuate Randomly” (Campbell et. al. 1997)

Eugene Fama’s (1970) theory about efficient capital markets is one of the most well-known theories about this topic in finance. According to Fama in efficient markets security prices totally reflect all of the information that is available at any given time. Also, every time new information is appearing it will shift to security prices immediately. This means that investors are not able to buy undervalued assets and earn excess returns this way. Assuming that comparison is made to a randomly picked portfolio of stocks and the risk levels are the same. (Malkiel 2003)

According to Fama (1970) one of the functions of capital markets is to allocate resources efficiently between different sectors. Basic assumptions are that investors will allocate money to the most profitable investing options and that all the information is available in assets. Markets can be said to be allocatively efficient when these assumptions are realized. Copelandin et al. (2005) According to Sharpe et. al. (1999) effective allocation of assets requires that markets are both internally efficient and externally efficient. Markets are internally efficient when transaction costs are low, and trading is fast. On externally efficient markets all the information is available for investors and these theories are based on Fama’s (1970) theories.

There are three different forms of market efficiency: weak form, semi-strong form and strong form efficiency. The Market's form of efficiency depended on the information

available and the level of information reflection on asset prices. When the level of market efficiency is weak, security prices adjust only the information from the past. In a weak form of efficiency investors are not able to predict future asset prices using only information about past stock price movements and this way they cannot systematically gain excess earnings. (Fama 1970)

The semi-strong form of efficiency information reflects stock prices faster. Also, more types of information are reflected in stock prices such as stock splits. In a semi-strong form of market efficiency all information that is public is transferred to security prices. Also, in this type of market efficiency investors are not able to gain excess returns using the information that is available. (Fama 1970)

Third form of market efficiency is called the strong form of efficiency. In this type of market efficiency all the information is reflected to stock prices. This means both the public information and the non-public information. Strong form of efficiency makes it impossible to gain any excess returns in the long run. (Fama 1970)

In 1991 Fama renamed these efficiency levels based on methods used to test them. According to Fama's newer forms, the weak level of efficiency can be understood as a study of prediction of stocks returns. Correspondingly the semi-strong form of efficiency can be found when published information reflects asset prices immediately and investors are not able to gain excess returns using it. Fama renamed this form of efficiency to be called event studies. Strong form of efficiency was renamed to test private information. According to Fama these titles described types of studies better. (Fama 1991)

Fama (1970) presented three rules for theoretically efficient markets. First, one would be able to trade stocks without any transaction costs. Second rule was that all relevant information from the markets would be available for all the participants without a cost. Third rule was that investors are unanimous about available information and its effects on stocks future prices. These rules are clearly just a theoretical approach to efficient markets, because in the real-world transaction costs exist and there will be asymmetric information available. Also, it is impossible that all the investors would be rational all the time on the markets. (Fama 1970) The market should be also structured so that all investors are equal. Trading cost should be the same for a large investor, even so he

is trading with an institution or large investor or large number of smaller investors. The cost structure of small order size should be taken into account. Also, all orders should be executed using the exact prices meaning the situation in which all potential investors were continually in contact with the stock market. (Black 1970)

Black (1970) describes the perfect market in his article. “Perfect market for a stock is one in which there are no profits to be made by people who have no special information about the company, and in which it is difficult even for people who do have special information to make profits, because the price adjusts so rapidly as the information becomes available. Thus, we would like to see randomness in the prices of successive transactions, rather than great continuity. Randomness means that a series of small upward movements (or small downward movements) is very unlikely. If the price is going to move up, it should move up all at once, rather than in a series of small steps. Large price movements are desirable, so long as they are not consistently followed by price movements in the opposite direction.” (Black 1970, 32)

Sharpe et. al. (1999) present that markets can be efficient defining stock prices without that all investors would closely follow up markets and all the information available would transfer to stocks prices. According to them markets can be efficient when most of the active investors are rational. This way stock prices reflect available information as well as possible and eliminate arbitrage possibilities. (Sharpe et. al. 1999)

According to Black (1986) markets are affected by noise. Noise makes it possible to trade in financial markets possible and sets up the possibility to speculate prices for financial assets. Some investors sometimes tend to trade on noise the same way as if it was information. Although they are wrong when expecting to make excess returns from these trades, noise is a crucial part of the existence of liquid markets. From an efficient capital markets point of view, it is essential to notice that noise trading has an effect on stock prices. Because there is noise on the market, prices are not fully efficient. The price of an asset reflects both the information that information traders trade on and the noise that noise trades trade on. For information traders it is also impossible to fully know if they are trading only based on information. This keeps capital markets inefficient. (Black 1986)

It is a common practice to divide information in terms of fundamental and non-fundamental information. Yields and macroeconomic factors are examples of fundamental information. (Fakhry 2016) According to Caballero and Krishnamurthy (2008) non-fundamental information is information that does not have any direct linkage to the stock, but still has the force to influence the asset price. This kind of information is for example the 9/11 terrorist attacks, bankruptcy of Lehman Brothers during the global financial crisis or the Earthquake in Japan in 2011. (Caballero & Krishnamurthy 2008)

2.4 Basic materials sector stocks and their characteristics

Basic materials sector is a group of stocks for firms that relate to the discovery, processing, and development of raw materials. The basic materials sector includes stocks from mining and metal industry, chemical sector, and forestry for example. It is important to notice that not all companies that are working with basic materials are included in this sector of stocks. Companies that are users of basic materials are not automatically included in this sector. Also, not all chemicals qualify as basic materials stocks. (Kopp 2019) In this research stocks are picked from Nasdaq OMX Helsinki stock exchange and their limitations are used to define basic materials stocks.

The tradeoff between risk and return is one of the issues investors have to face when trading equities. This concern is especially significant in sectors that are volatile such as the natural resource sector. There are at least three reasons why the natural resource business can be stated to be complex. First, natural resource businesses are capital intensive. It is expensive for companies to start new mining projects and pulp mills. Second, there is limited resource base that natural resource companies have to deal with. This means that companies from this sector must continuously search for low cost natural resource deposits. Third, natural resource companies produce products for example gold, copper, nickel, oil, pulp which is quite homogeneous. Because it is difficult to differ with products with raw commodities, the best performing natural resource companies usually have the lowest costs for production. This is seen with measures of ROI and stock price appreciation. (Sadorsky 2001)

The basic materials sector is very sensitive to the world economy. Basic materials sector is also known as a cyclical sector of stocks. Cyclical sector can be defined as "A cyclical industry is a type of industry that is sensitive to the business cycle, such that revenues generally are higher in periods of economic prosperity and expansion and are lower in periods of economic downturn and contraction. ". (Kenton 2020) Because this sector of stocks is quite diverse, stocks react differently to different news. Basic materials sector has historically performed well during early and late economic uptrend. (Schultz & Olson, 2014) However, sensitivity to business cycles vary largely between industries. Also, industry-specific factors might have an impact on triggering industry cycles that differ from macro-business cycles. (Berman & Pfleeger 1997)

Petersen and Strongin (1996) studied what make certain companies more cyclical than others. They found out that the key factor related to industry's products. Companies that manufactured durable goods were more cyclical than nondurable-goods industries. (Petersen & Strongin 1996) Basic materials sector industries products usually are nondurable, which makes them cyclical according to Petersen and Strongin.

3. PREVIOUS LITERATURE

In this chapter the previous literature related to the research topic is presented. Previous literature that is introduced can be divided into two main categories. First category of previous literature discusses the US-China trade war and its effects. The second category focuses on political announcements and trade policy actions. Most of the previous studies focus on the US market.

Fendel, Burggraf and Huynh (2019) analyzed Donald Trump's tweets. They investigated the impact of political news on asset price movements. Fendel et. al. analyzed more than 3200 tweets from Donald Trump. They found out that Trump's tweets that were related to the US-China trade war negatively predicted S&P 500 returns and VIX could be predicted positively. They also investigated results from different industries and found out that the results vary depending on trade intensity degree with China. The top three industries of US-China trade were electronic products, machinery and transportation equipment. These industries also had the highest negative returns that were related to Trump's tweets of the US-China trade war. Forest industry had the highest negative returns out of the industries that are studied also in this research. Also chemicals and minerals industries had negative average industry returns, but not as strong as forest industry stocks. (Fendel et. al. 2019)

Huang et. al. (2019) studied trade linkages and firms' value during the 2018 US-China trade war. They studied both US and Chinese markets and market reactions during trade war actions. They studied especially market reactions on nine US-China trade war related events. They found statistically significant results especially on March 22, 2018, that was one of the major events during the US-China trade war. They found out that more Chinese export and import dependent US firms had lower stock returns. They also found out that companies with larger average share of imports tend to experience greater decline in the stock market returns. Also, US firms that were more dependent on exports and imports from China had greater default risks around trade war announcements. Their analysis on Chinese companies revealed that firms' export exposure determined response to the US's tariffs. In general, they found out that

companies profiting and losing US-China trade war depend on their position in the global value chains. Also, there are differences between US and Chinese market returns. In general, Chinese stocks had negative returns on studied event dates on a wider scale than US stocks. (Huang et. al. 2019)

Qiu et. al. (2019) studied US-China trade from the trade literature point of view. Their research used trade literature theories to study the situation of the US-China trade war. These theories included imperfect competition and increasing returns. Also, distributional effects, political economy theory and terms of trade argument were studied. Their study confirmed that existing knowledge about trade literature cannot offer a complete picture about the situation of the US-China trade war. Some theories were practically relevant, and others were not. Trade literature can be a part of research, but when studying the US-China trade war it cannot be the only point of view. (Qiu et. al. 2019)

Hartigan, Perry and Kamma (1986) studied stock price reaction to trade policy events. Their study focused on the Trade act of 1974 (Section 201) using the event study method. Hartigan et. al. found out that changes in trade policy were beneficial for some beleaguered companies, but such advantages were not evenly divided between industries. (Hartigan et. al. 1986)

Calin (2015) analyzed impacts of trade announcements on financial markets. His event study investigated reactions of currencies to foreign trade announcements. He found out that so called main currencies were impacted the most. EUR, USD and in some cases, JPY had the greatest market reactions. Calin also discovered that macroeconomic announcements related to the trade balance had the largest impacts. These announcements were also often followed by the news regarding the future of imports and exports. (Calin 2015)

In terms of volatility, macroeconomic news and announcements were studied by Rangel (2009) and Huang (2007). Rangel used a mixture of GARCH models with a Poisson jump process to model volatility. He found out that macroeconomic events that surprise investors have a major role in explaining market volatility on event days. (Rangel, 2009) Also Huang investigated surprise effects and market volatility and had

similar findings that macroeconomic announcements days that surprised the market lead to increased volatility. (Huang 2007)

US macroeconomic announcements were studied by Rühl and Stein (2014). They examined different types of macroeconomic announcements from the US and their effect on European stock returns. They found out that certain announcements matter for European stock markets. Some announcements were more important from the perspective of European stock returns and effects also vary dramatically between stocks. According to their study stock-specific estimations are important when trying to understand the importance of announcements. Rühl and Stein also argue that researchers and practitioners who focus on European stock markets have to also consider the stock-specific effects on US stock market announcements. (Rühl and Stein 2014)

Crowley, Meng and Song (2018) studied the stock market actions of Chinese companies in industry of solar panels in response to several policy announcements related to restriction by the European Union and domestic policy changes by the Chinese government. They used event study methods to investigate this topic. Depending on the announcement there were various policy announcements that associated with abnormal returns on stock returns. (Crowley et. al. 2018)

Breinlich (2015) used an event study approach to research the impact of trade liberalization on firm level profits on the manufacturing sector. He studied events related to the Canada-United States Free Trade Agreement of 1989. He found out that Canadian import tariff reductions had statistically significant abnormal returns. The impact of U.S tariff reductions were less clear. Overall impact of these events was around 1,2% on increased per-period profits. (Breinlich 2015)

4. METHODOLOGY AND DATA

The purpose of this chapter is to present the history of event studies and the methodologies used in earlier studies. Also, the methodologies that are used in this study are introduced. This chapter also represents formulas that are applied in this research to calculate market returns, abnormal returns and beta values.

In this research event study methods by Fama, Fisher, Jensen & Roll are used (1969). Their methods for event study research are still widely used in economics and finance and they can be also suited for this research. Also event study theories by MacKinlay are combined to those methods. Market model is used in this research and the Stoxx 600 portfolio presents the market returns. Event windows and estimation windows are introduced as a concept and also the practical implementation that are used in this study are presented.

4.1 Event Study process

The first phase of event study methodology is to determine event date or event dates and time period that is used to count stock returns. In event study methodology this time period is called event window. This step is often one of the most difficult tasks in the event study process, because it might be difficult to separate “event” from all the other “events“ that might happen in the same time period. It might be also difficult to determine when the information actually impacts the market. It might be also possible that the information's impact spreads out over a long period of time. (Wells 2004) In this study event dates are in most cases easy to determine, because they are based on public announcements. Some event dates happened on weekends or during public holidays and for those reasons information is impacting the market the day after the announcement.

According to McWilliams and Siegel (1997) the most critical step of event study is choosing the length of an event window. Event window should be as short as possible, but long enough to capture the effects of the event (McWilliams & Siegel 1997). It is common practice to use a time period that is not immediately surrounded by the event

date when predicting normal returns. It is typical that normal returns are predicted from the time period before the event. When using daily data, the typical event window is usually 21-121 days and the estimation window lasts 100-300 days. Both windows are determined case by case and there are no strict rules to follow. There are advantages and disadvantages when using a long estimation window. Longer estimation window improves prediction model but makes model parameters more unstable. (Peterson, 1989) Longer event windows also have poor repeatability in results. Many researchers are using more narrow event windows in today's event studies. (Nageswara & Sreejith 2014)

In this study estimation window is 180 days and the event window is 21 days. Estimation window starts 190 days before the event date and ends 10 days before the event date. Event window is set -10 days before the event date (0) to +10 days after the event. Also, the event date is included to this 21-day total calculation. In this study it is impossible to set an estimation window to not overlap previous event dates, because there are 32 events during a relatively short period of time. 180-day estimation window lowers effect of previous events. It is typical that the estimation window and event window do not overlap, because that would distort variables. This way it is possible to measure both abnormal returns and normal returns around the event t=0. Other ways abnormal returns as well as normal returns estimations would consider event date to the calculations. (Scholes 1972) In this research event date is the date when political action was announced for the market.

Figure 1 presents a timeline for the event study process. Figure 1 shows t = 0 as the event date, which is the date that is used to compare revenues. Estimation window is defined from $t=T_0$ to $t=T_1$. Event window is determined to be from $t=T_1$ to $t=T_2$. Post-event window is set from $t=T_2$ to $t=T_3$ and it is used to compare revenues after the event date t=0. Lengths of each window was presented in the previous chapter.

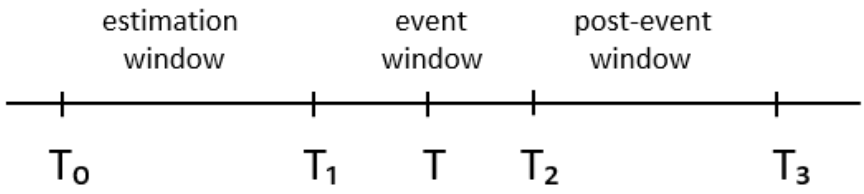

Figure 1 Event study process timeline

To estimate the effect of the events it is necessary to measure abnormal returns. *"The abnormal return is the actual ex post return of the security over the event window minus the normal return of the firm over the event window. The normal return is defined as the expected return without conditioning on the event taking place."* (MacKinley 1997, 15) Formula 1 presents the abnormal returns:

$$AR_{it} = R_{it} - E(R_{it}) \tag{1}$$

Where, AR_{it}, R_{it} and E(R_{it}) are the abnormal return, actual return and normal return respectively for time period t.

There are many ways for modeling normal returns and models can be categorized into statistical and economic. Models in statistical groups follow assumptions concerning the act of asset returns and they do not build on any economic arguments. (Campbell 1997, 153) Models in economic categories rely on assumptions that also concern investors' behavior and for that reason they are not fully based on statistical assumptions. (Campbell et. al. 1997) According to Brown and Warner (1985) market model is the best option for measuring normal returns in most cases when using event study methodology. *"The market model is a statistical model which relates the return of any given security to the return of the market portfolio."* For that reason, market models can provide more accurate results than simple statistical models. (Campbell et. al. 1997, 155) Also in this study market model is used to calculate normal returns. Following formula 2 presents the way normal returns are calculated in this research.

$$E(R_{it}) = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{2}$$

Where, R_{it} and R_{mt} are the period-t returns on asset i and the market portfolio. α_i represents the risk-free market return and β_i measures stock's volatility in relation to the overall market. This formula can be led to formula 3:

$$E(R_{it}) = \alpha_i + \beta_i R_{mt} \tag{3}$$

The larger stock's beta is the greater deviation it has on market. Beta can be estimated using Sharpe's market model. This is presented on formula 4:

$$\beta_i = \frac{COV\ (R_{i,}R_m)}{VAR\ (R_m)} \tag{4}$$

Where COV ($R_{i,}R_m$) is stock i and overall markets covariance. VAR (R_m) is market returns variance. (Vaihekoski, 2004) When beta is estimated, the alpha parameter can be also measured using following formula 5:

$$\alpha_i = \bar{R}_i - \beta_i \bar{R}_m \tag{5}$$

Where $\bar{R}_i$ is stocks average return during estimation window and $\bar{R}_m$ market average return during estimation window. Expected results formula 2 can be transformed to measure abnormal returns. Formula for abnormal returns (AR_{it}) is shown below on formula 6:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \tag{6}$$

Where R_{it} is stocks return on time period t. (MacKinlay, 1997). Next phase is to count abnormal returns for each stock separately. Average abnormal returns (AARt) can be counted by combining all of the abnormal stock returns together. This is counted on formula 7:

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it} \tag{7}$$

Where N is the total amount of observations and AR_{it} stock's abnormal return for period t. (MacKinlay 1997)

Next phase of event study after calculating average abnormal returns (AARt) is to measure statistical significance of the returns. In this study significance tests are executed using t-test. According to Brown and Warner (1980) the t-test is a good way to measure statistical significance.

Before it is possible to measure statistical significance, it is important to calculate variance of average abnormal returns. This can be measured using the following formula 8:

$$VAR\ (AAR_t) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_i^2 \tag{8}$$

Where σ_i^2 is variance of event windows and estimation windows abnormal returns (MacKinlay, 1997). In many studies σ_i^2 is measured using variance of estimation windows abnormal returns. According to Kothari and Warner (2006) this might be problematic in event studies. It is common that variances of estimation windows abnormal returns are larger than same measures from the event window. Therefore, the statistical significance of the event-window abnormal performance might be overstated if it is measured only using historical variability. For that reason, they suggest using cross-sectional variability of returns during the event and non-event periods. (Kothari & Warner 2006) In this study σ_i^2 is measured using both estimation window and event window variances, which means variance is calculated using data from 201 days.

Formula 9 is presenting the t-test that is used to measure statistical significance of abnormal returns (Vaihekoski 2004).

$$\frac{AAR_t}{\sqrt{VAR\ (AAR_t)}} \sim t(N) \tag{9}$$

Common practice in event studies is to also measure revenues from different time periods. To measure average cumulative abnormal returns, it is necessary to sum daily abnormal returns. This is presented on formula 10 below:

$$CAR(t_{1,}t_2)\sum_{t_1=1}^{t_2} AAR_t \tag{10}$$

Where $CAR(t_{1,}t_2)$is cumulative average abnormal return from moment 1 to moment 2. (MacKinlay, 1997)

After that it is possible to measure statistical significance for cumulative average abnormal returns. This is calculated the same way as statistical significance of daily average abnormal returns. (MacKinlay 1997) Formula 11 presents that:

$$t = \frac{CAR\ (t_{1,}t_2)}{\sqrt{VAR(CAR(t_1 t_2)}} \sim N(0,1) \tag{11}$$

Variance from formula X can be measured using formula 12 below: (Vaihekoski 2004)

$$VAR\big(CAR(t_1 t_2)\big) = \frac{1}{N^2}\sum_{i=1}^{N} \sigma_i^2\big(t_{1,}t_2\big) = (t_2 - t_1 + 1)\sigma_i^2(t_1 t_2) \tag{12}$$

4.2 History of event studies in economics and finance

Often economists are asked to analyze the value of company before and after an economic event. These kinds of studies are measured using an event study. Event study measures the impact of a specific event on the value of a firm, when using data from the financial market. (MacKinlay 1997, 13) It can be a useful tool in these studies, because of the assumption of investors rationality in the market the effects of an event will reflect rapidly in security prices. For that reason, the economic impact of an event can be studied using security prices observed over a quite short time period.

(MacKinlay 1997) In practice, there are two major reasons why event studies have been used. First, to test the null hypothesis that the market efficiency transfers information. Second reason is related to the market efficiency hypothesis and to measure the impact of events on the value of a firm's securities. (Binder 1998, 1)

Generally speaking, event studies can be divided into three categories. Speed and accuracy of a market's reaction on events are examined by market efficiency studies. Information impact studies calculate the extent to which different firms returns react to an event or events. Third category of event studies examines the abnormal returns among different subsections of securities. (Nageswara & Sreejith 2014) In economics and finance event studies are used for example to study accounting rule changes, earnings announcements, money supply announcements and changes in the severity of regulation. (Binder 1998)

Event studies have a long history. One of the first event studies published was James Dolley’s study from 1933. He studied the stock splits and their price effects, examining nominal price variation at the time of the split. Dolley’s data consisted of 95 splits between 1921 and 1931. The price increased in 57 of the cases and there was only 26 cases with price decline. (MacKinlay 1997)

From the early 1930s until the end of 1960s the commonness of the event studies step up. John H. Myers and Archie Bakay (1948), C. Austin Barker (1956, 1957, 1958), and John Ashley (1962) are examples of studies during this time period. They included some improvements to event studies for example by removing general stock market price movements and limiting out specific events. In the late 1960s researches by Ray Ball and Philip Brown (1968) and Eugene Fama et al. (1969) introduced the event study practices that are still commonly used in event studies of today. Ball and Brown studied the information content related to returns. Fama et al. removed the possible effects of simultaneous divided increases when examined the effects of stock splits. (MacKinlay 1997)

After these pioneering studies, many modifications have been developed. These modifications related to statistical assumptions used in early event studies and adjustments in the design to modify more specific hypotheses. (MacKinlay 1997) There are different options for modeling returns in event studies. They can be divided into

two categories depending on the approach. The first category, statistical models, consist of models that lean on statistical assumptions. They do not depend on any economic arguments when calculating the normal returns. (MacKinlay 1997)

Constant mean return model is probably the simplest model to measure mean returns. According to Brown and Warner (1980, 1985) constant mean return model can be used especially when using daily data. In these cases, the variance of the abnormal returns is often not reduced compared to more complicated models. (Brown & Warner 1980 & 1985) Mean-adjusted returns can be measured by subtracting the average return (AR) for an asset during the estimation period from the asset's return inside the event window. (Binder 1998)

The second category models, economic models, also notice investors behavior and for that reason are not totally based on statistical assumptions. The economic models have potential advantages in possibilities to calculate more exact measures of the normal returns. (MacKinlay 1997)

Also, two commonly used economic models are CAPM (Capital Asset Pricing Model) and APT (Arbitrage Pricing Theory). (MacKinlay 1997, 19) The Capital Asset Pricing Model was commonly used in event studies of the 1970s. After that some restrictions of the CAPM have led researchers to start using APT. (MacKinlay 1997)

Market model is a statistical model that relates the returns of any given security to the return of the market portfolio. (MacKinlay 1997, 18) Market portfolio that can be used in applications can be a broad-based stock index for example S&P 500. Market models show the impact of single security by removing the return that is related to the market's return. (MacKinlay 1997) Market model approach is widely used, because it is straightforward and quite easy to use. Market model method controls for the risk of an asset and the movement of the market during the event period. (Binder 1998)

4.3 Issues related to event studies

Although event studies are widely used in finance and economics, they contain some assumptions, which has led to critique considering the reliability of event studies. First of all, it can be difficult to determine the event date when using for example news from financial publications. When the event is announced in the paper it is hard to estimate if the market was informed prior to the close of the market the prior trading day. This issue can be handled by using a method of expanding the event window. This method makes it easier to capture the event. (MacKinlay 1997) There is also evidence that a longer event window leads to statistically weaker results in event studies. When using long event windows, it is harder to control confounding results. This is especially the case when studying large international corporations. (McWilliams & Siegel 1997)

On the other hand, it might be useful to smaller the length of event windows to capture only the effect of the studied event. According to Nageswara and Sreejith (2014) the main objective of an event study is to precisely evaluate the impact of an event. It is challenging to eliminate the effect of different events that happened at the same time. Because of the simultaneous appearances of the events it is hard to ascertain the impact of one event on stock returns. Examples of these situations are for example joint venture announcements, dividends, administration changes, earnings declarations, and acquisition activities. All of these events have the ability to swing the market price in relation to a specific event's impact assessment. The short-horizon event windows make it easier to control the confounding events. It is possible to decrease the impact of confounding events in the data by analyzing the news related to the firm from the event dates. (Nageswara & Sreejith 2014, 44) By analyzing the event dates and company specific news it is possible to identify the ones that are around event dates and event windows, which helps to erase confounding event's impact on stock returns. (Nageswara & Sreejith 2014)

According to Wells (2004) it might cause issues in event studies if a market model is used. Market model is dependent on beta, which is estimated from stocks historical returns. Theoretically beta is a measure of stocks future variability. Traditionally beta is estimated for about 12 months prior to or right after the event date. There is also an assumption that beta is constant and beta value can be determined from information

from the past. However, tests have shown that beta is not constant over time. It is also notable that beta moves with firm's stock price returns and returns on the market. For this reason, beta is also exposed for macroeconomic changes such as interest rates and trade balances. In extreme cases this is especially distinct. The events associated with September 11, 2001 provided information that not all firms or industry sectors were affected in the same way. Companies that had headquarters in the World Trade Center were affected more than average. Also, airlines were affected strongly as well. Cases like this that have a long-term effect on the economy complicate accurate beta estimations. (Wells 2004)

Some significant events that have nothing to do with a particular firm can cause change in stock market reactions. These events are called meta events. Because of these events, the comparison between different time periods may largely differ. For example, the September 11, 2001 event triggered market circumstances for a year. Time also acts upon a significant role in the event studies through data stationarity. "The major factor for lack of stationary is due to the change in perception of investors over a period of time. The lack of stationary provides one result for a period and a diverse outcome for another period." Stationarity is highly significant in long-horizon event studies. (Nageswara & Sreejith, 2014, 44)

4.4 Data

Data for this study is gathered from three sources. Yahoo Finance, Bank of Finland and Nasdaq OMX Nordic. Yahoo Finance was used to get historical daily data for Finnish and Swedish basic materials stocks. Historical stock price information was collected and analyzed 190 trading days before the first event date and 10 trading days after the last studied event. Including estimation window and event window the data is from November 2016 to January 2019.

Basic materials sector of stocks was defined using Nasdaq OMX Nordic as a reference (Nasdaq 2020). When using their categories and limitations for company size, there were in total seven basic materials stocks from OMX Helsinki large cap and five

materials stocks from Nasdaq Stockholm large cap. Only one series of stock on each company was studied. Stock series that had the most trading volume was chosen. Database of the Bank of Finland was used to collect information on risk free rate of return. In this study Euribor 12-month rate was used as a risk-free rate. Euribor 12-month rate was studied using daily data. Stoxx 600 stock index was used to measure market returns. This index was picked because it is a wide index that represents European stock markets. If OMX Helsinki or Nasdaq Stockholm indices were used, the basic materials sector might have had too much weight, which might have lowered this study's reliability.

Table 1. Companies and Stock Series from OMX Helsinki large cap (Nasdaq 2020)

Company	**Stock series**
Ahlström Munksjö Oyj	AM1
Kemira Oyj	KEMIRA
Metsä Board Oyj	METSB
Outokumpu Oyj	OUT1V
SSAB	SSABBH
Stora Enso Oyj	STERV
UPM-Kymmene Oyj	UPM

Table 1 represents companies and stock series that were studied in this research from Finnish market. All of these stocks are categorized as basic materials stocks by Nasdaq and they are listed in OMX Helsinki large cap. All of the stocks filled the limitations and for that reason were also studied in this research.

Table 2. Companies and Stock Series from Nasdaq Stockholm large cap (Nasdaq 2020)

Company	**Stock Series**
BillerudKorsnäs AB	BILL
Boliden AB	BOL
Hexpol	HPOL B
Holmen AB	HOLM B
SCA	SCA B

Table 2 presents basic materials stocks from Swedish market that were studied in this research. Lundin Mining corporation fits all the limitations that were used in this study, but from this study's point of view Lundin Mining stock started trading too late. The first day of trading for Lundin Mining was June 8, 2017. Because of this, Lundin Mining was left out of the studied stocks.

In this research adjusted closing prices were used for each company and Stoxx 600 index. Adjusted closing prices were used, because they include information of possible stock splits, public offerings and dividend payments. Studied US-China related events happened between August 2017 to December 2018. During this time period it is possible that there are at least some dividend payments appeared and their effects on returns are removed using adjusted closing prices.

Data in this research is studied in the big picture from the basic materials sector point of view. Each stock is also studied individually to gain better understanding of differences between companies. In total there were 32 US-China trade war events that were studied. These events were collected from different sources. More about the events and the timeline of the US-China trade war is displayed in chapter two. List of studied events are listed on appendix 1.

5. EMPIRICAL RESULTS

In this chapter, the empirical results are displayed. Average abnormal returns (AAR) and cumulative average abnormal returns (CAAR) are presented ten days before and after the event day. Seven time intervals are used to present cumulative average abnormal returns. The result section is divided in different sections based on studied samples. Total sample, Finnish market and Swedish market are presented separately. Studied stocks and their results are shown in a section that relates the market that the specific stock is listed. All of the results are studied using 5% statistically significance level. T-test is used to study statistical significances. Formulas to AAR and CAAR calculations are presented in chapter four. At the end of this chapter empirical results are examined critically.

5.1 Empirical results total sample

Table 3 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of total sample.

	SWE & FIN						
Day (t)	AAR		t-ratio	CAAR (-10, t)		CAAR (t1,t2)	J1
-10	0.05%		0.51	0.05%	CAAR-10,-1	0.04%	0.152027
-9	0.24%	*	2.73	0.29%			
-8	0.79%	*	8.88	1.08%	CAAR -5,-1	-0.51% *	-2.53694
-7	-1.14%	*	-12.77	-0.06%			
-6	0.61%	*	6.79	0.55%	CAAR -1, +1	0.09%	0.985195
-5	0.15%	*	1.71	0.70%			
-4	-0.39%	*	-4.34	0.32%	CAAR 0,0	0.39% *	4.350244
-3	-0.22%	*	-2.50	0.09%			
-2	-0.32%	*	-3.61	-0.23%	CAAR 0, +1	-0.19%	-1.47305
-1	0.27%	*	3.07	0.04%			
0	0.39%	*	4.35	0.43%	CAAR +1, +5	-1.00% *	-5.02063
1	-0.58%	*	-6.43	-0.14%			
2	-0.29%	*	-3.24	-0.43%	CAAR +1, +10	-0.95% *	-3.36622
3	0.40%	*	4.45	-0.03%			
4	-0.24%	*	-2.73	-0.28%			
5	-0.29%	*	-3.28	-0.57%			
6	0.31%	*	3.43	-0.27%			
7	0.05%		0.61	-0.21%			
8	0.42%	*	4.69	0.21%			
9	-0.08%		-0.84	0.13%			
10	-0.65%	*	-7.30	-0.52%			

* = statistically significant (5%)

The average abnormal returns and cumulative average abnormal returns of the total sample are presented in table 3. The total sample consists of 384 events and 12 stocks from Finnish and Swedish stock exchanges. As we can see from the table, there are statistically significant AARs on most of the days inside the event window. There are also statistically significant AARs on the event date and near the event day. This suggests that investors are able to foresee possible announcements before the event date.

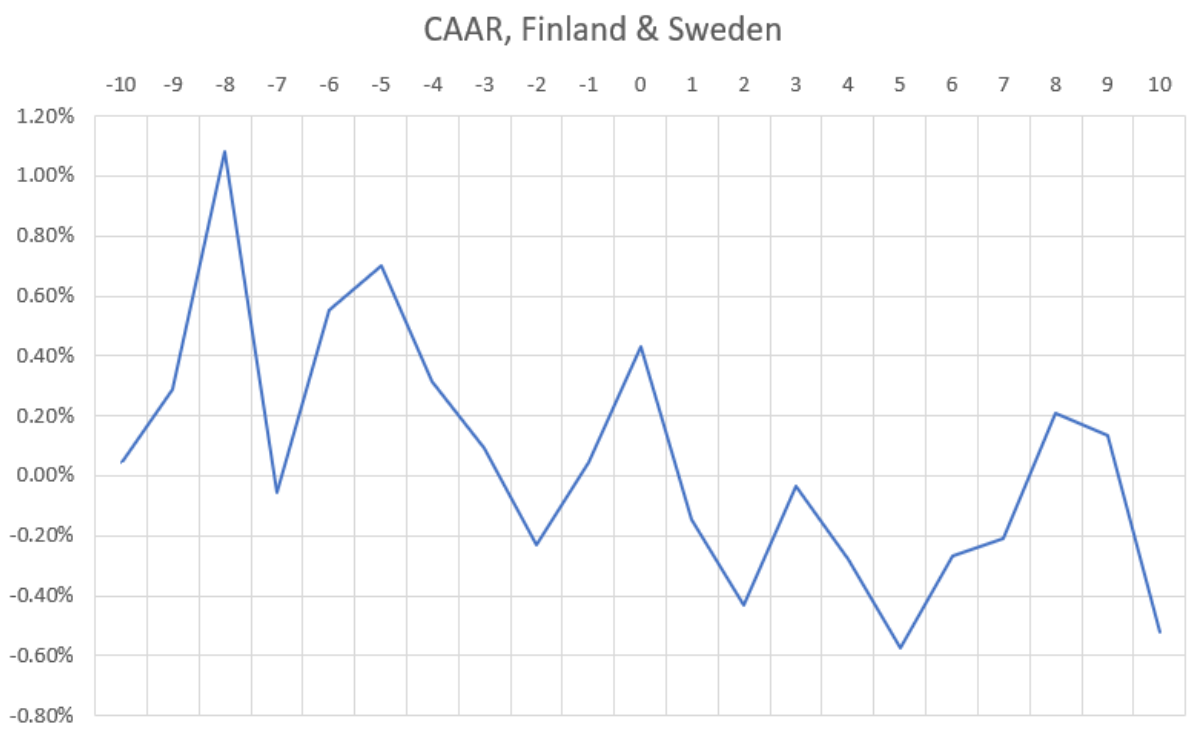

Figure 2 Cumulative abnormal returns (CAAR) of total sample

Based on CAARs investors seem to lower their future earnings expectations as a reaction to US-China trade war events. The 5-day post-event CAAR [+1, +5] is -1,00% and the 10-day post-event CAAR is -0,95%. Both post-event windows CAARs are statistically significant, which suggest that investors react negatively to US-China trade war events. The reaction is not immediate and according to CAAR results the market is not working efficiently. Also, the CAAR from the whole event window is -0,52%, which supports the negative reaction that is observable in post-event window results.

Based on these results, the null hypothesis, which suggests that the US-China trade war events do not have effect on the Finnish and Swedish large cap materials stocks,

can be rejected. There is a clear reaction to US-China trade war events. Also, the cumulative post-event reaction can implicate that the investors are re-evaluating the information that is available related to stocks. According to Lubatkin et al. (1989) these kinds of post-event reactions are possible. Also, in some events it is possible that more information is released after the actual event. (Lubatkin et. al. 1989)

5.2 Empirical results Finland

Table 4 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Finnish materials stocks.

	Finland total							
Day (t)	AAR		t-ratio	CAAR (-10, t)		CAAR (t1,t2)		J1
-10	-0.12%		-0.93	-0.12%	CAAR-10,-1	-0.70%	*	-1.75014
-9	0.05%		0.41	-0.07%				
-8	0.21%		1.67	0.15%	CAAR -5,-1	-1.08%	*	-3.81246
-7	0.07%		0.54	0.22%				
-6	0.16%		1.30	0.38%	CAAR -1, +1	-0.04%		-0.31504
-5	-0.33%	*	-2.61	0.05%				
-4	-0.17%		-1.32	-0.12%	CAAR 0,0	0.01%		0.049539
-3	-0.10%		-0.77	-0.22%				
-2	-0.33%	*	-2.57	-0.54%	CAAR 0, +1	0.12%		0.663386
-1	-0.16%		-1.25	-0.70%				
0	0.01%		0.05	-0.70%	CAAR +1, +5	-0.17%		-0.59431
1	0.11%		0.89	-0.58%				
2	-0.27%	*	-2.12	-0.85%	CAAR +1, +10	-0.43%		-1.07884
3	0.01%		0.07	-0.84%				
4	0.24%		1.91	-0.60%				
5	-0.26%	*	-2.08	-0.87%				
6	-0.22%	*	-1.75	-1.09%				
7	-0.44%	*	-3.50	-1.53%				
8	0.10%		0.80	-1.43%				
9	0.15%		1.22	-1.27%				
10	0.14%		1.14	-1.13%				

* = statistically significant (5%)

Average abnormal returns and cumulative average abnormal returns of Finnish materials stocks are presented in table 4. Finnish materials stocks sample consisted of seven stocks and 32 events. In total 224 events were studied. As presented in table 4, Finnish materials stocks also had abnormal returns near the event date, but statistical significance is not as clear as it is with results from the total sample. There are six dates in the event window that are statistically significant, and all of these dates have negative reactions to US-China trade war events.

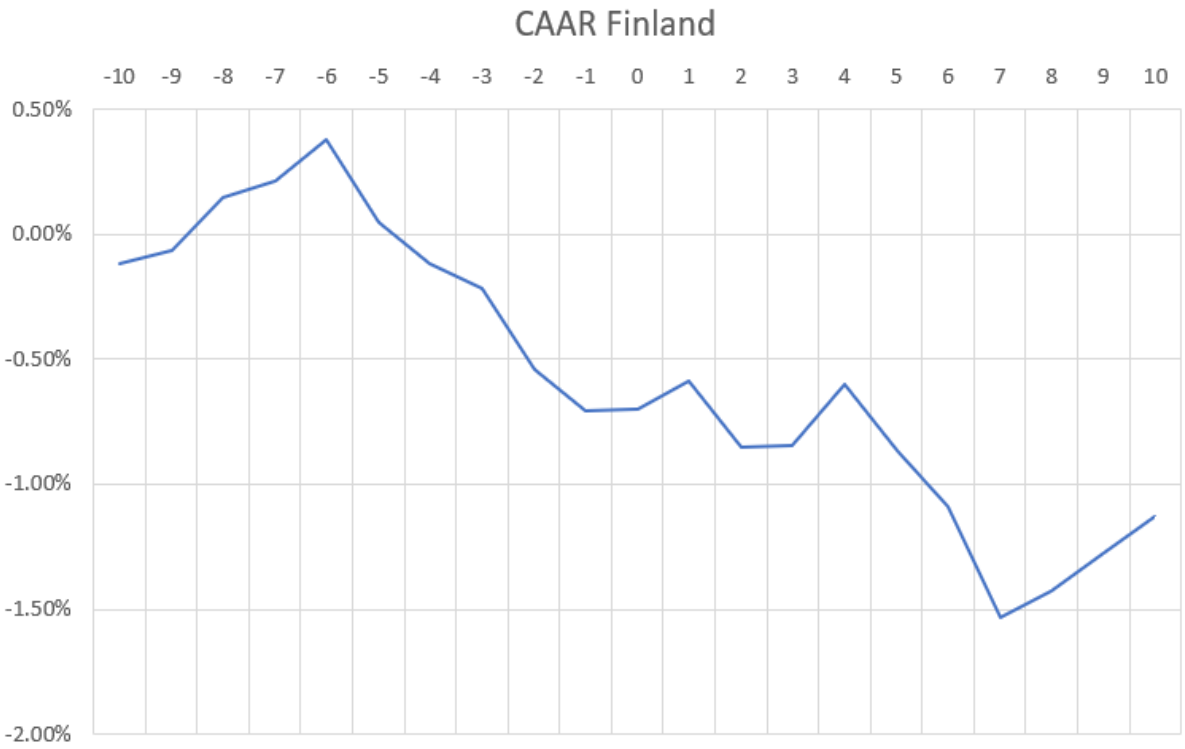

Figure 3 Cumulative average abnormal returns of Finnish basic materials stocks

Based on the CAARs, investors seem to react to US-China trade war events before and after the actual event date. Pre-event CAAR shows statistically significant results from [-10, -1] and [-5, -1] with returns of -0,70% and -1,08%. These results indicate that investors see US-China trade war events as a negative sign in the stock market. Although there are weak positive CAAR from -9 to -6 days before the event, these days have no statistical significance. According to these results it seems that the market is expecting US-China related events or there is some information that is already available on the market before the actual event. Total CAAR from the event window is -1,13% for Finnish basic materials stocks.

5.2.1 Stock level analysis Finland

In this part of the chapter empirical results are presented for each studied Finnish basic materials stock. This part answers the third research question about the difference between stocks' reaction to US-China trade war events. Stocks are presented in alphabetical order. In total 32 events were studied for each stock.

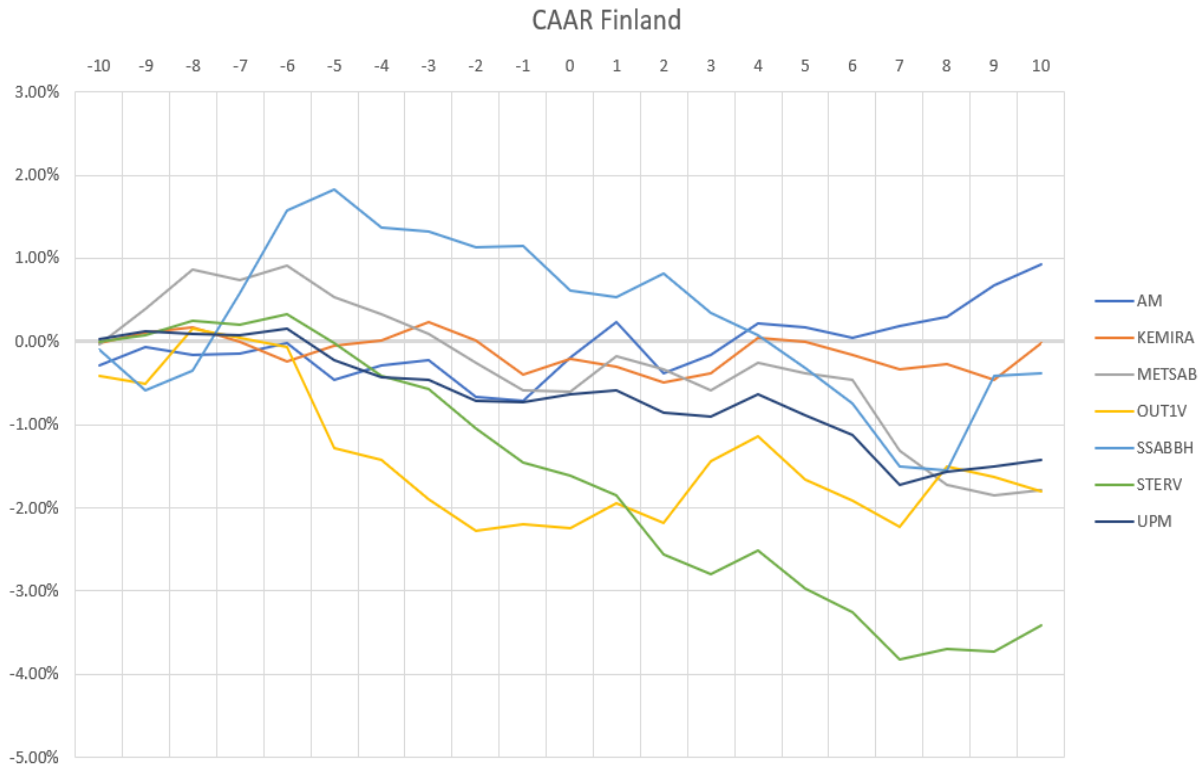

Figure 4 Cumulative average abnormal returns of Finnish large cap materials stocks

Table 5 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Ahlström Munksjö

	AM						
Day (t)	AAR		t-ratio	CAAR (-10, t)		CAAR (t1,t2)	J1
-10	-0.28%		-0.97	-0.28%	CAAR-10,-1	-0.71%	-0.77605
-9	0.22%		0.76	-0.06%			
-8	-0.09%		-0.31	-0.16%	CAAR -5,-1	-0.69%	-1.06169
-7	0.01%		0.03	-0.15%			
-6	0.12%		0.43	-0.02%	CAAR -1, +1	0.91% *	3.126178
-5	-0.43%		-1.49	-0.45%			
-4	0.17%		0.58	-0.29%	CAAR 0,0	0.52% *	1.784435
-3	0.07%		0.24	-0.22%			
-2	-0.45%		-1.55	-0.67%	CAAR 0, +1	0.95% *	2.317364
-1	-0.04%		-0.15	-0.71%			
0	0.52%	*	1.78	-0.19%	CAAR +1, +5	0.36%	0.555972
1	0.43%		1.49	0.24%			
2	-0.62%	*	-2.13	-0.38%	CAAR +1, +10	1.12%	1.218613
3	0.22%		0.76	-0.16%			
4	0.38%		1.29	0.22%			
5	-0.05%		-0.18	0.17%			
6	-0.12%		-0.41	0.05%			
7	0.15%		0.50	0.19%			
8	0.10%		0.34	0.29%			
9	0.38%		1.30	0.67%			
10	0.26%		0.88	0.92%			

* = statistically significant (5%)

Average abnormal returns and cumulative average abnormal returns are presented in table 5. As we can see from table 5, there are statistically significant average abnormal returns on event date and two days after the event. Event date average abnormal returns are positive (0,52%) and average abnormal returns two days after the event negative (-0,62%). Based on the CAAR results there are statistically significant positive returns on event date and near it. CAAR [-1, +1] is 0,91%, CAAR [0,0] is 0,52% and CAAR [0, +1] is 0,95%. According to these findings US-China trade war events have had statistically significant results on stock returns of Ahlström Munksjö. Pre-event CAAR and post-event CAAR did not have statistically significant results. These results suggest that investors tend to react positively for US-China trade war events when it comes to the stock of Ahlström Munksjö.

Table 6 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Kemira

		KEMIRA				
Day (t)	**AAR**	**t-ratio**	**CAAR (-10, t)**		**CAAR (t1,t2)**	**J1**
-10	-0.02%	-0.08	-0.02%	CAAR-10,-1	-0.39%	-0.54723
-9	0.12%	0.54	0.10%			
-8	0.06%	0.28	0.17%	CAAR -5,-1	-0.16%	-0.30914
-7	-0.17%	-0.74	0.00%			
-6	-0.24%	-1.04	-0.23%	CAAR -1, +1	-0.32%	-1.41919
-5	0.18%	0.81	-0.05%			
-4	0.07%	0.31	0.02%	CAAR 0,0	0.18%	0.805994
-3	0.21%	0.95	0.23%			
-2	-0.22%	-0.96	0.02%	CAAR 0, +1	0.09%	0.273587
-1	-0.41%	-1.81	-0.39%			
0	0.18%	0.81	-0.21%	CAAR +1, +5	0.21%	0.408983
1	-0.09%	-0.42	-0.30%			
2	-0.19%	-0.84	-0.49%	CAAR +1, +10	0.18%	0.258831
3	0.11%	0.51	-0.38%			
4	0.41%	1.83	0.04%			
5	-0.04%	-0.17	0.00%			
6	-0.16%	-0.71	-0.16%			
7	-0.18%	-0.79	-0.34%			
8	0.07%	0.31	-0.27%			
9	-0.20%	-0.88	-0.47%			
10	0.44%	1.97	-0.02%			

* = statistically significant (5%)

Table 6 presents average abnormal returns and cumulative abnormal returns of Kemira. According to these results presented above there are no statistically significant average abnormal returns. Also, the CAAR results from different time intervals are not statistically significant. Based on the result there is no effect on US-China trade war events on Kemira stock that is statistically significant. CAAR from the whole event window is -0,02%, which also indicates that studied events did not have an effect on Kemira stock returns.

Table 7 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Metsä Board

		METSAB				
Day (t)	AAR	t-ratio	CAAR (-10, t)		CAAR (t1,t2)	J1
-10	-0.04%	-0.13	-0.04%	CAAR-10,-1	-0.59%	-0.59925
-9	0.43%	1.37	0.39%			
-8	0.48%	1.55	0.87%	CAAR -5,-1	-1.51% *	-2.15784
-7	-0.13%	-0.42	0.74%			
-6	0.17%	0.56	0.91%	CAAR -1, +1	0.08%	0.257714
-5	-0.38%	-1.22	0.53%			
-4	-0.20%	-0.64	0.33%	CAAR 0,0	-0.01%	-0.04446
-3	-0.25%	-0.80	0.08%			
-2	-0.34%	-1.09	-0.26%	CAAR 0, +1	0.41%	0.939567
-1	-0.33%	-1.07	-0.59%			
0	-0.01%	-0.04	-0.61%	CAAR +1, +5	0.22%	0.312436
1	0.43%	1.37	-0.18%			
2	-0.17%	-0.53	-0.34%	CAAR +1, +10	-1.18%	-1.19797
3	-0.25%	-0.79	-0.59%			
4	0.34%	1.09	-0.25%			
5	-0.14%	-0.44	-0.39%			
6	-0.07%	-0.23	-0.46%			
7	-0.86% *	-2.76	-1.32%			
8	-0.40%	-1.27	-1.72%			
9	-0.13%	-0.40	-1.84%			
10	0.06%	0.18	-1.79%			

* = statistically significant (5%)

Table 7 and figure 4 present average abnormal returns and cumulative abnormal returns of Metsä Board. Based on AAR results there are statistically significant results seven days before the event (-0,86%). All the AARs in the event window are not statistically significant. The 5-day pre-event CAAR [-5, -1] is -1,51% and it is statistically significant. These results are in line with the results of the total sample of Finnish stocks. CAAR from the whole event window is -1,79%, which supports the results from AARs and CAARs that are statistically significant.

Table 8 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Outokumpu

		OUTV1				
Day (t)	AAR	t-ratio	CAAR (-10, t)		CAAR (t1,t2)	J1
-10	-0.41%	-0.92	-0.41%	CAAR-10,-1	-2.20%	-1.57006
-9	-0.09%	-0.21	-0.50%			
-8	0.66%	1.49	0.16%	CAAR -5,-1	-2.14% *	-2.15917
-7	-0.11%	-0.25	0.04%			
-6	-0.11%	-0.24	-0.06%	CAAR -1, +1	0.33%	0.738027
-5	-1.21% *	-2.74	-1.28%			
-4	-0.15%	-0.33	-1.42%	CAAR 0,0	-0.04%	-0.08172
-3	-0.48%	-1.08	-1.90%			
-2	-0.37%	-0.84	-2.27%	CAAR 0, +1	0.25%	0.406537
-1	0.07%	0.16	-2.20%			
0	-0.04%	-0.08	-2.24%	CAAR +1, +5	0.57%	0.579843
1	0.29%	0.66	-1.95%			
2	-0.23%	-0.52	-2.18%	CAAR +1, +10	0.44%	0.314668
3	0.74%	1.66	-1.44%			
4	0.29%	0.66	-1.15%			
5	-0.52%	-1.16	-1.66%			
6	-0.26%	-0.58	-1.92%			
7	-0.30%	-0.69	-2.22%			
8	0.71%	1.61	-1.51%			
9	-0.12%	-0.28	-1.63%			
10	-0.16%	-0.37	-1.80%			

* = statistically significant (5%)

Table 8 and figure 4 present average abnormal returns and cumulative abnormal returns of Outokumpu. There is statistically significant AAR five days before the event (-1,21%). This is the only statistically significant AAR from the event window. Based on CAAR results there are statistically significant results on 5-day pre-event CAAR [-5, -1], which is -2,14%. CAAR from the whole event window is -1,80%.

Table 9 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Stora Enso

		STERV				
Day (t)	AAR	t-ratio	CAAR (-10, t)		CAAR (t1,t2)	J1
-10	0.00%	0.00	0.00%	CAAR-10,-1	-1.45% *	-1.79738
-9	0.08%	0.31	0.08%			
-8	0.16%	0.64	0.24%	CAAR -5,-1	-1.78% *	-3.12352
-7	-0.03%	-0.13	0.21%			
-6	0.12%	0.49	0.33%	CAAR -1, +1	-0.80% *	-3.13384
-5	-0.34%	-1.35	-0.01%			
-4	-0.41%	-1.59	-0.42%	CAAR 0,0	-0.16%	-0.61901
-3	-0.15%	-0.59	-0.57%			
-2	-0.48%	-1.87	-1.05%	CAAR 0, +1	-0.40%	-1.0971
-1	-0.40%	-1.58	-1.45%			
0	-0.16%	-0.62	-1.61%	CAAR +1, +5	-1.36% *	-2.38163
1	-0.24%	-0.93	-1.84%			
2	-0.71% *	-2.77	-2.55%	CAAR +1, +10	-1.80% *	-2.23525
3	-0.24%	-0.95	-2.79%			
4	0.28%	1.09	-2.52%			
5	-0.45%	-1.77	-2.97%			
6	-0.29%	-1.14	-3.26%			
7	-0.56% *	-2.19	-3.82%			
8	0.12%	0.47	-3.70%			
9	-0.03%	-0.12	-3.73%			
10	0.32%	1.24	-3.41%			

* = statistically significant (5%)

Average abnormal returns and cumulative average abnormal returns for Stora Enso are shown in table 9. There are two AARs in the event window that are statistically significant. Two days after the event date AAR is -0,71% and seven days after the event date AAR is -0,56%. Based on CAARs from different time intervals there is clear evidence that US-China trade war events have affected Stora Enso stock returns. There are statistically significant CAARs before, around and after the event date. The 10-day pre-event CAAR [-10, -1] is -1,45% and 5-day pre-event CAAR [-5, -1] is -1,78%. CAAR around the event [-1, +1] is -0,80%. Both post-event CAARs have also negative values, CAAR [+1, +5] is -1,36% and CAAR [+1, +10] is -1,80%. Cumulative average abnormal returns from the total event window are -3,41%. Based on CAARs it seems like the investors lower their future earnings expectations as a reaction to US-China trade war events. From figure 4, we can see that the negative reaction last almost the whole 21-day event window. Reaction for Stora Enso is also the most visible from all of the studied Finnish large cap materials stocks.

Table 10 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of UPM

		UPM				
Day (t)	AAR	t-ratio	CAAR (-10, t)		CAAR (t1,t2)	J1
-10	0.02%	0.11	0.02%	CAAR-10,-1	-0.72%	-1.03112
-9	0.10%	0.45	0.12%			
-8	-0.03%	-0.15	0.09%	CAAR -5,-1	-0.87% *	-1.75858
-7	-0.01%	-0.06	0.08%			
-6	0.07%	0.33	0.15%	CAAR -1, +1	0.13%	0.603338
-5	-0.38%	-1.70	-0.23%			
-4	-0.20%	-0.92	-0.43%	CAAR 0,0	0.09%	0.403251
-3	-0.03%	-0.16	-0.47%			
-2	-0.25%	-1.12	-0.72%	CAAR 0, +1	0.14%	0.449972
-1	-0.01%	-0.03	-0.72%			
0	0.09%	0.40	-0.63%	CAAR +1, +5	-0.25%	-0.50119
1	0.05%	0.23	-0.58%			
2	-0.27%	-1.20	-0.85%	CAAR +1, +10	-0.80%	-1.13369
3	-0.05%	-0.21	-0.90%			
4	0.26%	1.19	-0.63%			
5	-0.25%	-1.13	-0.88%			
6	-0.23%	-1.06	-1.12%			
7	-0.60% *	-2.71	-1.72%			
8	0.15%	0.70	-1.56%			
9	0.05%	0.24	-1.51%			
10	0.08%	0.36	-1.43%			

* = statistically significant (5%)

AARs and CAARs of UPM can be seen in table 10 and figure 4. These results are well in line with the results of the total sample of Finnish materials stocks. UPM results have the same kind of characteristics with the highest abnormal returns on the same day and cumulative average abnormal returns on the same time interval as Finnish materials stocks total sample. AAR seven days after the event date has statistically significant results with returns of -0,60%. The 5-day pre-event CAAR [-5, -1] is -0,87%, which is also statistically significant at 5% risk level. CAAR from the whole event window is -1,43%. These results suggest that there are some statistical significance but based on CAARs information has already reached the market before the actual event date.

Table 11 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of SSABB

		SSABBH				
Day (t)	AAR	t-ratio	CAAR (-10, t)		CAAR (t1,t2)	J1
-10	-0.10%	-0.20	-0.10%	CAAR-10,-1	1.15%	0.731598
-9	-0.49%	-0.98	-0.59%			
-8	0.24%	0.49	-0.35%	CAAR -5,-1	-0.43%	-0.38932
-7	0.93%	1.87	0.58%			
-6	1.00%	2.01	1.58%	CAAR -1, +1	-0.61%	-1.22806
-5	0.25%	0.50	1.83%			
-4	-0.46%	-0.92	1.37%	CAAR 0,0	-0.54%	-1.08156
-3	-0.05%	-0.11	1.32%			
-2	-0.18%	-0.36	1.14%	CAAR 0, +1	-0.62%	-0.88229
-1	0.01%	0.02	1.15%			
0	-0.54%	-1.08	0.61%	CAAR +1, +5	-0.93%	-0.84143
1	-0.08%	-0.17	0.53%			
2	0.30%	0.59	0.82%	CAAR +1, +10	-1.00%	-0.63468
3	-0.47%	-0.95	0.35%			
4	-0.27%	-0.55	0.08%			
5	-0.40%	-0.81	-0.32%			
6	-0.42%	-0.85	-0.74%			
7	-0.75%	-1.51	-1.50%			
8	-0.05%	-0.09	-1.54%			
9	1.13% *	2.28	-0.41%			
10	0.02%	0.05	-0.38%			

* = statistically significant (5%)

Average abnormal returns and cumulative average abnormal returns for SSAB are presented in table 11. Cumulative average abnormal returns of SSAB are also shown in figure 4. Only AARs nine days are statistically significant with 1,13% average abnormal returns. AARs on event date are negative with -0,54% average abnormal returns. but they are not statistically significant. Based on CAARs from different time intervals, there are no statistically significant results. Total CAAR from the whole event window is -0,38%. According to these results presented in table 11 and figure 4, US-China trade war events do not have immediate effect on SSAB stock returns.

5.3 Empirical results Sweden

Table 12 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Swedish materials stocks.

	Sweden total							
Day (t)	**AAR**		**t-ratio**	**CAAR (-10, t)**		CAAR (t1,t2)		J1
-10	0.27%	*	2.28	0.27%	CAAR-10,-1	1.09%	*	2.862709
-9	0.51%	*	4.28	0.79%				
-8	1.61%	*	13.40	2.40%	CAAR -5,-1	0.30%		1.111907
-7	-2.84%	*	-23.61	-0.44%				
-6	1.23%	*	10.22	0.79%	CAAR -1, +1	0.27%	*	2.226559
-5	0.83%	*	6.92	1.62%				
-4	-0.70%	*	-5.80	0.92%	CAAR 0,0	0.92%	*	7.698766
-3	-0.40%	*	-3.33	0.52%				
-2	-0.32%	*	-2.64	0.21%	CAAR 0, +1	-0.61%	*	-3.61389
-1	0.88%	*	7.34	1.09%				
0	0.92%	*	7.70	2.01%	CAAR +1, +5	-2.17%	*	-8.08993
1	-1.54%	*	-12.81	0.47%				
2	-0.32%	*	-2.65	0.15%	CAAR +1, +10	-1.68%	*	-4.41682
3	0.94%	*	7.85	1.10%				
4	-0.92%	*	-7.70	0.17%				
5	-0.33%	*	-2.78	-0.16%				
6	1.05%	*	8.71	0.89%				
7	0.75%	*	6.27	1.64%				
8	0.86%	*	7.19	2.50%				
9	-0.40%	*	-3.31	2.10%				
10	-1.77%	*	-14.73	0.33%				

* = statistically significant (5%)

Average abnormal returns and cumulative average abnormal returns of Swedish materials stocks are presented in table 12. Swedish materials stocks sample consisted of five stocks and 32 events. In total 160 events were studied. As presented in table 12, Swedish materials stocks have abnormal returns on every day inside the event window that are statistically significant at 5% risk level. The largest daily average abnormal returns are seven days before the actual event date. On event date AARs are 0,92%. Based on AARs, US-China trade war events have an effect on Swedish materials stocks.

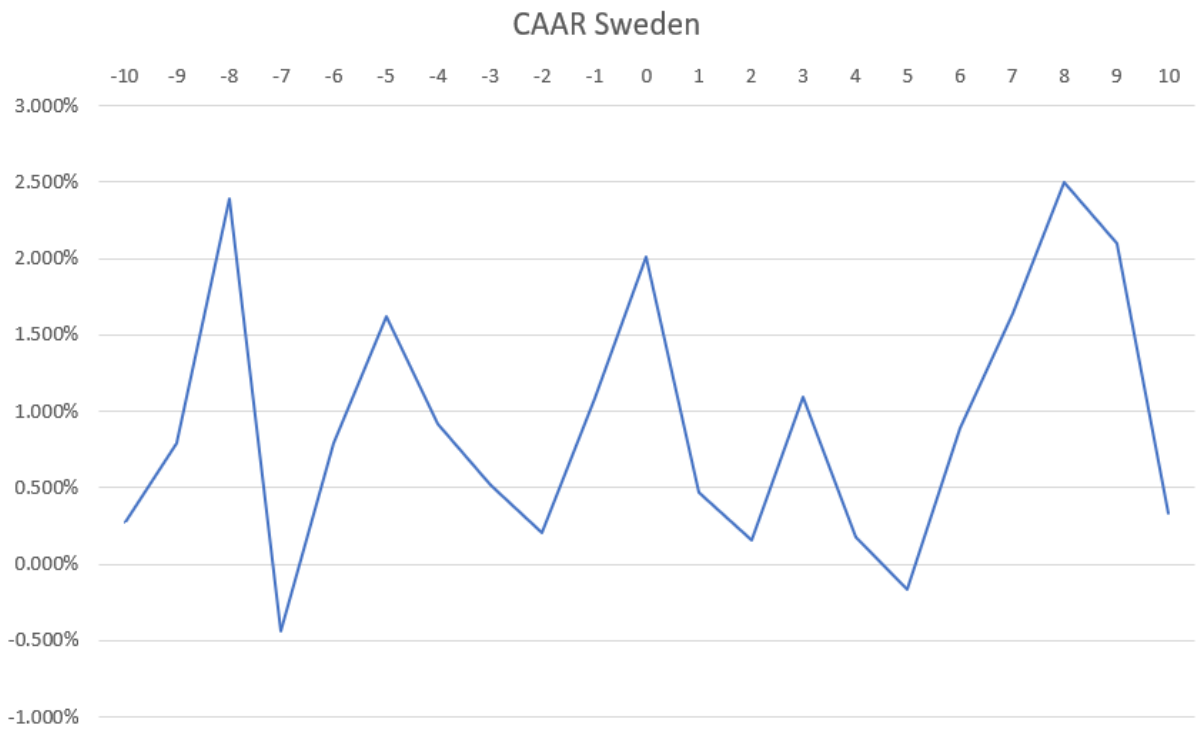

Figure 5 Cumulative average abnormal returns of Swedish large cap materials stocks

CAARs from different time intervals have also statistically significant results. The 10-day pre-event CAAR [-10, -1] is 1,09%. Also, CAAR [-5, -1] is positive 0,30%, but it is not statistically significant. CAARs around the event have statistically significant results that turn negative after the event. CAAR [-1, +1] is 0,27% and event date CAAR [0,0] is 0,92%. After that time interval all of the rest tested time intervals have negative returns. CAAR [0, +1] -0-61%, CAAR [+1, +5] -2,17% and CAAR [+1, +10] -1,68%. Figure 5 shows cumulative average abnormal returns from the total sample of Swedish large cap materials stocks. As we can see, there is quite much variance between the days inside the event window. Based on AARs and CAARs Swedish large cap materials stocks have positive average abnormal returns before and on the event date. After the event investors seem to lower their future earnings expectations, which seems to happen also with the total sample Finnish and Swedish materials stocks combined. The difference is that Swedish market has larger variance. Also, Swedish materials stocks sample is smaller, which raises the weight of one stock in AARs and CAARs. The CAAR from the whole event window is 0,33%.

5.2.1 Stock level analysis Sweden

In this part of the chapter empirical results are presented for each studied Finnish basic materials stock. This part answers the third research question about the difference between stocks' reaction to US-China trade war events. Stocks are presented in alphabetical order. In total 32 events were studied for each stock.

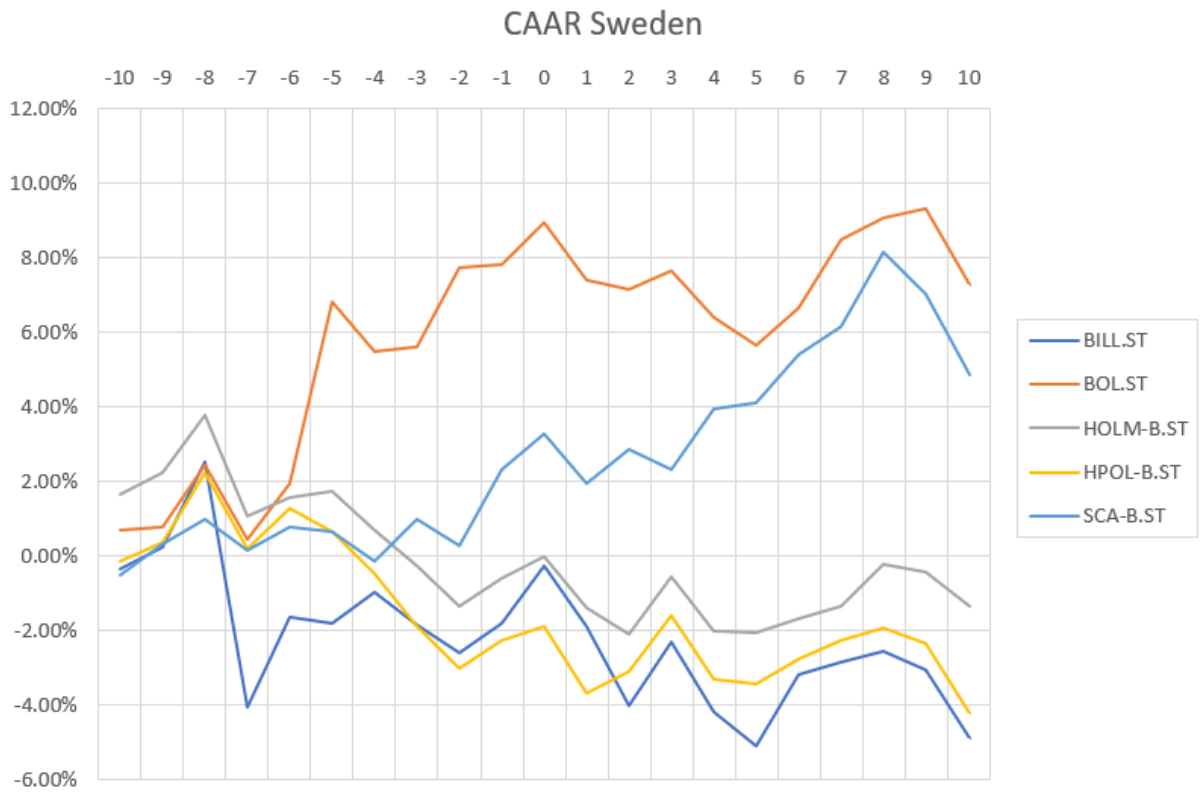

Figure 6 Cumulative average abnormal returns of Swedish large cap basic materials stocks

Figure 6 presents the cumulative average abnormal returns of studied Swedish materials stocks. Based on these results, stocks are divided into two groups in Swedish samples. Other group has quite high positive CAAR from different time intervals and the other group negative CAAR from different time intervals.

Table 13 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of BillerudKorsnäs

			BILL.ST					
Day (t)	AAR		t-ratio	CAAR (-10, t)		CAAR (t1,t2)		J1
-10	-0.33%		-1.28	-0.33%	CAAR-10,-1	-1.82%	*	-2.25524
-9	0.56%	*	2.18	0.23%				
-8	2.31%	*	9.04	2.54%	CAAR -5,-1	-0.20%		-0.34749
-7	-6.61%	*	-25.88	-4.07%				
-6	2.45%	*	9.59	-1.62%	CAAR -1, +1	0.72%	*	2.832689
-5	-0.18%		-0.71	-1.80%				
-4	0.85%	*	3.31	-0.96%	CAAR 0,0	1.57%	*	6.151573
-3	-0.88%	*	-3.43	-1.83%				
-2	-0.77%	*	-3.02	-2.61%	CAAR 0, +1	-0.06%		-0.17316
-1	0.79%	*	3.08	-1.82%				
0	1.57%	*	6.15	-0.25%	CAAR +1, +5	-4.85%	*	-8.50454
1	-1.63%	*	-6.40	-1.88%				
2	-2.15%	*	-8.41	-4.03%	CAAR +1, +10	-4.62%	*	-5.7289
3	1.71%	*	6.69	-2.32%				
4	-1.84%	*	-7.23	-4.17%				
5	-0.94%	*	-3.67	-5.10%				
6	1.91%	*	7.47	-3.20%				
7	0.36%		1.40	-2.84%				
8	0.28%		1.10	-2.56%				
9	-0.50%		-1.96	-3.06%				
10	-1.81%	*	-7.10	-4.87%				

* = statistically significant (5%)

Average abnormal returns and cumulative average abnormal returns for BillerudKorsnäs are presented in table 13. Cumulative average abnormal returns of BillerudKorsnäs are also shown in figure 6. Most of the studied days inside the event window have statistically significant AARs. The highest one day AARs are seven days before the event date, which are -6,61%. AARs on event date are positive with 1,57% average abnormal returns and they are statistically significant at 5% risk level. Also, AARs near the actual event date have statistically significant results.

Based on CAARs from different time intervals, there are statistically significant results before, around and after the event date. Total CAAR from the whole event window is -4,87%. According to these results presented in table 13 and figure 6, US-China trade war events have impacted BillerudKorsnäs stock returns negatively before and after the event, but positively around the event date. The 10-day pre-event CAAR [-10, -1] is -1,82%. Near the event date CAARs are [0,0] 1,57% and [-1, +1] 0,72%. The 5-day post-event CAAR [+1, +5] is -4,85% and the 10-day post-event CAAR [+1, +10] is -4,62%. Cumulative average abnormal returns from the whole event window are -4,87%.

Table 14 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Boliden

		BOL.ST					
Day (t)	AAR		t-ratio	CAAR (-10, t)		CAAR (t1,t2)		J1
-10	0.68%		1.87	0.68%	CAAR-10,-1	7.83%	*	6.8605
-9	0.09%		0.26	0.77%				
-8	1.68%	*	4.66	2.45%	CAAR -5,-1	5.87%	*	7.27271
-7	-1.99%	*	-5.52	0.46%				
-6	1.50%	*	4.16	1.96%	CAAR -1, +1	-0.36%		-0.99005
-5	4.86%	*	13.47	6.83%				
-4	-1.34%	*	-3.70	5.49%	CAAR 0,0	1.10%	*	3.045848
-3	0.13%		0.36	5.62%				
-2	2.13%	*	5.89	7.75%	CAAR 0, +1	-0.44%		-0.86668
-1	0.09%		0.24	7.83%				
0	1.10%	*	3.05	8.93%	CAAR +1, +5	-3.26%	*	-4.04375
1	-1.54%	*	-4.27	7.39%				
2	-0.22%		-0.60	7.17%	CAAR +1, +10	-1.67%		-1.4588
3	0.47%		1.29	7.64%				
4	-1.23%	*	-3.40	6.41%				
5	-0.74%	*	-2.06	5.67%				
6	0.98%	*	2.72	6.65%				
7	1.83%	*	5.06	8.48%				
8	0.58%		1.62	9.06%				
9	0.25%		0.68	9.31%				
10	-2.04%	*	-5.65	7.27%				

* = statistically significant (5%)

Table 14 and figure 6 present average abnormal returns and cumulative abnormal returns of Boliden. Cumulative average abnormal returns of Boliden are also shown in figure 6. There are statistically significant AARs before, near and after the event date. The largest single day AAR is five days before the event date and AAR is 4,86%. On event date AAR is 1,10% and it is statistically significant at 5% risk level.

Based on CAARs from different time intervals, there are also statistically significant results before, around and after the event date. CAAR from the whole event window is 7,27%. Both tested pre-event CAARs are statistically significant and they are positive. The 10-day pre-event CAAR is 7,83% and 5-day pre-event CAAR is 5,87%. The 5-day post-event CAAR is also statistically significant and it is -3,26%. All of the tested post-event CAARs have negative returns, but the 5-day post-event CAAR is the only one that has statistically significant results. Based on the results presented in table 14 and figure 6 investors seem to change their earnings expectations of Boliden stock after the US-China trade war events. Before the event date there are high statistically significant positive AARs that make the cumulative average abnormal returns also high on the whole event window. Out of all studied stocks from Finnish and Swedish markets Boliden has the largest positive abnormal returns.

Table 15 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Hexpol

			HPOL-B.ST				
Day (t)	AAR		t-ratio	CAAR (-10, t)		CAAR (t1,t2)	J1
-10	-0.12%		-0.53	-0.12%	CAAR-10,-1	-2.27% *	-3.13264
-9	0.48%	*	2.08	0.35%			
-8	1.88%	*	8.21	2.23%	CAAR -5,-1	-3.54% *	-6.92258
-7	-2.06%	*	-8.99	0.18%			
-6	1.10%	*	4.80	1.27%	CAAR -1, +1	-0.67% *	-2.90897
-5	-0.61%	*	-2.66	0.67%			
-4	-1.16%	*	-5.05	-0.49%	CAAR 0,0	0.38%	1.680284
-3	-1.41%	*	-6.15	-1.90%			
-2	-1.13%	*	-4.94	-3.03%	CAAR 0, +1	-1.43% *	-4.4086
-1	0.76%	*	3.33	-2.27%			
0	0.38%		1.68	-1.88%	CAAR +1, +5	-1.53% *	-2.99412
1	-1.81%	*	-7.91	-3.69%			
2	0.58%	*	2.55	-3.11%	CAAR +1, +10	-2.33% *	-3.2238
3	1.51%	*	6.59	-1.60%			
4	-1.69%	*	-7.41	-3.30%			
5	-0.12%		-0.51	-3.41%			
6	0.66%	*	2.90	-2.75%			
7	0.50%	*	2.20	-2.25%			
8	0.32%		1.41	-1.93%			
9	-0.40%		-1.76	-2.33%			
10	-1.89%	*	-8.24	-4.21%			

* = statistically significant (5%)

Table 15 and figure 6 present average abnormal returns and cumulative abnormal returns of Hexpol. Hexpol has statistically significant AARs inside the event window. On the actual event date AAR is 0,38%, but it is not statistically significant. The largest single day AAR of Hexpol is seven days before the event date and it is -2,06%. As we can see in table 15, there are also statistically significant AARs before and after the event date.

Based on cumulative average abnormal returns there are statistically significant results before and also after the event date. All of the studied pre-event and post-event windows are statistically significant and have negative CAARs. Negative CAARs are also visible in figure 6, where cumulative abnormal returns last almost the entire 21-day event window. Largest CAAR value of studied time intervals is CAAR [-5, -1] that has -3,54% abnormal returns. Cumulative average abnormal returns from the whole event window are -4,21%. Based on these result US-China trade war events have effect on Hexpol stock returns. According to these findings the reaction starts already before the actual event date and some of the information that related Hexpol stock might have reached market before the announcements or events.

Table 16 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of Holmen

			HOLM-B.ST					
Day (t)	AAR		t-ratio	CAAR (-10, t)		CAAR (t1,t2)		J1
-10	1.66%	*	7.53	1.66%	CAAR-10,-1	-0.61%		-0.87865
-9	0.60%	*	2.70	2.26%				
-8	1.53%	*	6.95	3.79%	CAAR -5,-1	-2.18%	*	-4.42188
-7	-2.70%	*	-12.25	1.09%				
-6	0.48%	*	2.17	1.57%	CAAR -1, +1	-0.02%		-0.11232
-5	0.18%		0.83	1.75%				
-4	-1.05%	*	-4.76	0.70%	CAAR 0,0	0.59%	*	2.689149
-3	-0.96%	*	-4.36	-0.26%				
-2	-1.09%	*	-4.95	-1.35%	CAAR 0, +1	-0.76%	*	-2.44984
-1	0.74%	*	3.35	-0.61%				
0	0.59%	*	2.69	-0.02%	CAAR +1, +5	-2.06%	*	-4.1695
1	-1.36%	*	-6.15	-1.38%				
2	-0.73%	*	-3.29	-2.10%	CAAR +1, +10	-1.34%	*	-1.91603
3	1.54%	*	7.00	-0.56%				
4	-1.47%	*	-6.67	-2.03%				
5	-0.05%		-0.22	-2.08%				
6	0.41%		1.86	-1.66%				
7	0.30%		1.38	-1.36%				
8	1.13%	*	5.13	-0.23%				
9	-0.22%		-0.98	-0.45%				
10	-0.91%	*	-4.12	-1.36%				

* = statistically significant (5%)

Average abnormal returns and cumulative average abnormal returns for Holmen are presented in table 16. Cumulative average abnormal returns of Holmen can be found in figure 6. Also, Holmen stock AARs are mostly statistically significant. The highest single day AAR is seven days before the event date, and it is 2,70%. AARs on the event date and near it are also statistically significant. Event date AAR for Holmen is 0,59%.

Cumulative average abnormal returns of Holmen are positive at the beginning of the event window. After that, the cumulative average abnormal returns turn to negative. This is also shown in table 16, that presents different time interval CAARs of Holmen. The 5-day pre-event CAAR [-5, -1] is -2,18%, which is statistically significant. Also, the event date CAAR [0, 0] 0,59% and CAAR [0, +1] -0,76% are statistically significant at 5% risk level. After the event date all studied CAAR time intervals are statistically significant with negative returns. CAAR from the whole event window is -1,36%. Based on figure 6 and the result presented in table 16, US-China trade war events have negative effects on Holmen stock returns.

Table 17 Daily average abnormal returns (AAR) and cumulative abnormal returns (CAAR) of SCA

			SCA-B.ST					
Day (t)	AAR		t-ratio	CAAR (-10, t)		CAAR (t1,t2)		J1
-10	-0.52%		-2.04	-0.52%	CAAR-10,-1	2.30%	*	2.876585
-9	0.84%	*	3.33	0.33%				
-8	0.64%	*	2.55	0.97%	CAAR -5,-1	1.54%	*	2.723129
-7	-0.82%	*	-3.25	0.15%				
-6	0.61%	*	2.41	0.76%	CAAR -1, +1	1.66%	*	6.56576
-5	-0.10%		-0.40	0.66%				
-4	-0.78%	*	-3.10	-0.12%	CAAR 0,0	0.98%	*	3.853595
-3	1.11%	*	4.40	0.99%				
-2	-0.72%	*	-2.86	0.27%	CAAR 0, +1	-0.37%		-1.0434
-1	2.03%	*	8.04	2.30%				
0	0.98%	*	3.85	3.28%	CAAR +1, +5	0.84%		1.493234
1	-1.35%	*	-5.33	1.93%				
2	0.92%	*	3.62	2.84%	CAAR +1, +10	1.57%	*	1.964628
3	-0.51%		-2.02	2.33%				
4	1.62%	*	6.39	3.95%				
5	0.17%		0.69	4.12%				
6	1.27%	*	5.01	5.39%				
7	0.77%	*	3.05	6.16%				
8	2.00%	*	7.89	8.16%				
9	-1.11%	*	-4.40	7.05%				
10	-2.20%	*	-8.68	4.85%				

* = statistically significant (5%)

SCA's stock AARs and CAARs are presented in table 17 and figure 6. There are statistically significant AARs throughout the event window. The highest single day AARs are one day before the event date with 2,03% average abnormal returns. On event date AAR is 0,98% that is also statistically significant on 5% risk level.

Based on CAARs and cumulative average abnormal returns the US-China trade war events have positive effects on SCA stock returns. Both 10-day and 5-day pre-event CAARs are positive and they are statistically significant. Event day CAAR [0, 0] is 0,98% and also statistically significant. The 10-day post-event CAAR [+1, +10] is 1,57% and CAAR from the whole event window 4,85%. Presented In figure 6, SCA's CAARs are mostly positive throughout the whole event window. The last two days of the event window lower the CAAR of the whole event window, but keeping the returns positive.

5.3 Differences between stock markets

In this part of the chapter five differences between Finnish and Swedish market empirical results will be discussed. The second research question relates to the difference between markets. The null hypothesis is that there are no differences between Finnish and Swedish markets in reaction to trade war events.

Based on AARs in tables 3, 4 and 12, there is clear evidence that Finnish and Swedish large cap materials stocks react differently to US-China trade war events. Swedish large cap basic materials stocks have statistically significant AARs on every day of the event window. Compared to Finnish large cap basic materials stocks, that have statistically significant AARS in only six days inside the event window. Finnish market is also lacking statistically significant AARs on event dates and days before and after it. Swedish basic materials stocks also have higher single day AARs compared to Finnish sample. The highest single day AAR for Finnish market is -0,44% and -2,84% for Swedish market.

The results also difference when comparing CAARs from tables 3, 4 and 12 For Finnish large cap basic materials stocks CAARs from the whole event window are negative. Whole event window CAAR is -1,13%. For Swedish market this same CAAR is positive and it is 0,33%. CAARs from different time intervals also have differences between Finnish and Swedish markets. Swedish market has positive pre-event CAARs and positive CAAR from the event date that are statistically significant. Finnish market instead has statistically significant negative pre-event CAARs. After the event date Swedish sample has statistically significant negative CAARs from different time intervals, but Finnish sample does not have statistically significant results from the same time periods.

Figures 4 and 6 support these findings. When comparing CAARs from Finnish and Swedish markets, Swedish market CAARs have a lot more variance than Finnish market CAARs. Swedish sample also has more difference between stocks, which might explain greater variance inside the event window. There are also more stocks in Finnish sample, which lowers the effect of one specific stock.

Finnish and Swedish materials stock samples also have differences, when studying single basic materials stock reactions. Studied Swedish basic material stocks have more variance than the ones studied from Finnish market. Figures 4 and 6 present CAARs for each studied company. Swedish companies have the highest positive CAARs and also the lowest negative CAARs from all of the studied stocks.

Based on these results, the null hypothesis, which suggests that there is no difference between Finnish and Swedish markets in reaction to the US-China trade war event, can be rejected. There is clear evidence that studied stock samples react differently on US-China trade war events. Although results from both markets suggest that there is statistically significant evidence of US-China trade war events causing reactions on the market, AARs and CAARs show differences in reaction.

5.4 Critical approach to results

In this research US-China trade war events are studied using event study methodology. The main purpose of this study is to find out, if there is any statistically significant evidence, that US-China trade war events affected Finnish and Swedish large cap materials stocks. Other research questions related differences between markets and companies. In this part of chapter five the results of this study are viewed critically.

All of the studied events are listed on appendix 1. As we can see, most of the studied events happened during a relatively short period of time. Out of 32 studied events, in total of 26 have event windows that overlap each other. This is important to notice, when looking at the results of this research. According to Nageswara and Sreejith (2014) the main objective of an event study is to precisely evaluate the impact of an event. It is challenging to eliminate the effect of different events that happened at the same time. Because of the simultaneous events it is hard to estimate the impact of one event on stock returns. In this study confounding events are hard to limit out, without limiting the number of studied events dramatically. Because in this research the focus is finding out the possible effects of US-China trade war events, it is not necessary to know the exact moment, when the market reaction happened. More important is to

know if any statistically significant reaction exists. Also, the events are the same for all of the studied companies and markets, which makes it possible to compare results.

In this study research the market model is used to estimate returns. According to Wells (2004) this might cause issues, because the market model is dependent on beta. Beta is estimated from stocks historical returns and the assumption is that beta is constant, and it can be determined using information from the past. However, tests have shown that beta is not constant over time. It is also notable that beta moves with firm's stock price returns and returns on the market. For this reason, beta is also exposed for macroeconomic changes such as interest rates.

Events, their specialties and differences between markets are things that should be noticed when examining the results of this research. Some of the events that are studied in this research happened outside the opening hours of stock exchanges. When studying these events, the actual event date is the next opening day of stock exchange. In these cases, the information was able to transfer into stock prices when the stock exchange opened again. There are also some minor differences between Finnish and Swedish stock exchange opening days. This might cause differences in results of AARs, but the 21-day event window is able to capture the event regardless of that.

6. CONCLUSIONS

The objective of this study was to examine the impact of US-China trade war events to the market value of Finnish and Swedish basic materials stocks and therefore also to investors' future earnings expectations. In this research 32 US-China trade war related events were studied for seven Finnish and five Swedish basic materials companies. All of these events happened from August 2017 to December 2018.

This study answers three research questions. The first question is answered with the total sample from both studied stock markets. The second question is answered using samples from each country on their own and the final question by comparing results on company level. The following result were found:

- Investors tend to react negatively to US-China trade war related events. This indicates that they lower their future earnings expectations of basic materials stocks. There are statistically significant positive reactions on event date at 5% risk level and event date AAR is 0,39%. However, the 5-day and 10-day post-event CAARs are negative and statistically significant. These CAARs are -1,00% and -0,95%. Also, the 21-day event window CAAR is -0,52%. Based on these results, the null hypothesis of the study is rejected, and Finnish and Swedish basic materials stocks have statistically significant cumulative reaction to the US-China trade war events.

- There is also a clear difference in the market reaction of basic materials stocks in Finnish and Swedish market. There is statistically significant negative pre-event reaction in Finnish basic materials stocks sample. The 21-day event window CAAR for Finnish sample is -1,13%. There is more variance in Swedish sample compared to Finnish basic materials stocks sample. The 10-day pre-event CAAR for Swedish basic materials stocks is 1,09% and statistically significant at 5% risk level. Also, the post-event CAARs are statistically significant and negative with CAAR [+1, +5] -2,17% and CAAR [+1, +10] -1,68% returns. These results indicate that there is statistically significant difference between Finnish and Swedish basic material stocks reaction to US-China trade

war events. For this reason, the second null hypothesis is also rejected and there are differences between stock markets.

- Company level reactions to US-China trade war related events differ between companies inside the basic materials stock category. The 21-day event window CAARs have reactions that differ from positive to negative between companies. Almost all of the studied companies have statistically significant AARs or CAARs from different time intervals. Kemira was the only company that this study did not find statistically significant reactions to US-China trade war events. Based on these results, the null hypothesis that companies do not have different reactions to US-China trade war events can be rejected.

The main findings of this study are that in general US-China trade war events have had varying results on Finnish and Swedish basic materials stocks. Results from Finnish market are quite well in line with results of Fendel et. al. (2019), who found negative average abnormal returns from several industries in the US market. They also found out that forest industry stocks had the strongest negative AARs, which is also the case in this research. Results from Swedish market are not in line with results of Fendel et. al. and Swedish market stock reactions to US-China trade war events are more volatile. Although results from Finnish and Swedish markets are different, the total sample results are in line with study of Fendel et. al.

When comparing results from study by Huang et. al (2019) and this research, there are similarities related to different markets' reaction to US-China trade war events. Huang et. al. found out that Chinese market had negative returns on a wider scale compared to the US market. In this research Finnish and Swedish basic materials stocks reacted in a different manner to US-China trade war events. Huang et. al. found out that winners and losers in the US-China trade war depend on their position in the global value chains. In this research global value chains were not studied, but results that are linked with varying results between companies are in line with study of Huang et. al.

Possible areas for future study arise from this research. In this research only short-term stock price reactions were studied. Therefore, a logical way to study this topic more would be to examine long-term performance of large cap basic materials stocks

from Finnish and Swedish stock exchanges. Based on the results of this study, the stock price reaction in many cases lasts many days. By adding more event windows before and after the event date the future studies could analyze stock reactions even better. Also adding more industries to the study would give better understanding about effects of the US-China trade war on Finnish and Swedish market. Based on previous literature (Fendel, et. al. 2019 & Huang et. al. 2019) there are differences in stock returns between industries depending on their trade intensity degree with China. For future research this might be an interesting topic to study for Finnish and Swedish market too. As mentioned before, there are not any studies from Finnish and Swedish basic materials stocks reactions to US-China trade war events prior to this to the knowledge of the author. Together with results of this study and lack of previous literature, further research is still needed.

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APPENDICES

Appendix 1 Studied event dates from the US-China trade war

Date	Event
August 14, 2017	Trump signs executve memo directing US Trade Representative Robert E. Lighthizer to start the new investigation on China's unfair trade practices (Section 301 Investgation)
January 22, 2018	Trump approves tariffs of up to 50 percent on solar panels and 30 percent on washing machines
March 1, 2018	The Trump administration announced tariffs on steel and aluminium
March 22, 2018	Following the release of the Section 301 report, the US announced tariffs on $50 billion of Chinese imports. This action target "Made in China 2025" plan
March 23, 2018	Chinese government hit back with a list of 128 products that would face 15-25% tariffs
April 2, 2018	China's Ministry of Commerce rolled out tariffs on the 128 US products that they proposed on March 23, 2018
April 3, 2018	Following the March 22 presidential memorandum, the US published a proposed list of Chinese products that would be facing a tariff based on the Section 301 Investigation
April 4, 2018	Shortly after the publication of the US list, China responded by announcing the imposition of a 25% tariff on a list of US products (worth $50 billion)
April 4, 2018	Bloomberg reports that Trump instructed the USTR to study more tariffs on $100 billion of Chinese products
April 8, 2018	At the Boao Asia Forum, President Xi announced that China will expand market access and actively increase imports
April 12, 2018	Trump orders top officials to assess the possibility of joining The Trans-Pacific-Partnership (TPP)
April 16, 2018	The US Commerce Department banned American companies from selling parts, software and components to ZTE Corp
May 20, 2018	US Treasury Secretary Steven Mnuchin announced a pause in the trade war
May 29, 2018	The Trump administration announced it would go ahead with its proposal from March 3, 2018

June 15, 2018	The US announced tariffs worth $50 billion of imports from China
June 18, 2018	Trump directed the USTR to identify $200 billion worth of Chinese goods for additional tariffs at a 10 percent rate
July 6, 2018	Tariffs on Chinese goods worth $34 billion in imports began
July 10, 2018	Trump administration announced tariffs on a new list of Chinese goods worth $200 billion at a rate of 10 percent
August 2, 2018	The USTR states that it will increase the tariff rate from 10 to 25 percent for the list released on July 10
August 3, 2018	China decides to impose tariffs of 5 to 25 percent on US goods worth about $60 billion
August 7, 2018	The USTR announced that it will impose a 25 percent tariff on $16 billion of goods starting from August 23
August 8, 2018	China decides to impose a 25 percent tariff on US $16 billion worth of imports when the Trump administration tariffs go into effect on August 23
August 23, 2018	The US and China implement second round of tariffs. US implements a 25 percent tariff on 279 Chinese imported goods
September 6, 2018	President Donald Trump threatens to impose more tariffs worth $267 billion
September 17, 2018	The United States finalizes tariffs on $200 billion of Chinese goods
September 18, 2018	China announces that it will implement tariffs on $60 billion worth of US goods
September 22, 2018	China cancels trade talks planned with the US ahead of the impending implementation of US tariffs on $200 billion worth of Chinese imports
September 24, 2018	The United States and China implement third round of tariffs
October 25, 2018	US and China officials resume contact after weeks of silence to prepare a meet between Trump and Xi at G20 meet in Argentina
October 30, 2018	The US prepares to announce more tariffs for Chinese products by early December if meet between Trump and Xi is not successful.
November 19, 2018	The US Bureau of Industry and Security (BIS) publishes a proposed rules for export control on emerging technologies.

December 1, 2018	US and China agree to temporary truce at the G20 Summit in Buenos Aires
December 14, 2018	China lowers temporarily tariffs on US auto parts for three months, beginning on January 1, 2019. China also resumes its purchases of US-soybeans.

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