Vaasan yliopisto
UNIVERSITY OF VAASA

Petteri Heinonen

Stock market reactions to layoff announcements in Finland 2010–2019

School of Accounting and Finance
Master's Thesis
Master's Degree Programme in Finance

Vaasa 2022

UNIVERSITY OF VAASA
School of Accounting and Finance
Author: Petteri Heinonen
Title of the Thesis: Stock market reactions to layoff announcements in Finland 2010–2019
Degree: Master of Science in Economics and Business Administration
Programme: Master's Degree Programme in Finance
Supervisor: Janne Äijö
Year: 2022 **Pages:** 88

ABSTRACT :

The main purpose of the study is to examine the Finnish stock market reactions to layoff announcements published by companies. Previous empirical research on the relationship between layoff announcements and the stock market has shown that the stock market generally reacts negatively to layoff announcements. Since prior empirical research has also shown that certain characteristics of layoffs may affect how the stock market reacts, the purpose is also to examine whether, among other things, the reason for the layoffs, the size of the layoffs, and the size of the company affect the stock market reaction.

The full sample of the study consists of 384 layoff announcements published by 77 companies listed on the Nasdaq Helsinki in the years from 2010 to 2019. The layoff announcements are further divided into sub-samples to study the impact of the above-mentioned layoff characteristics on the reaction. The stock market reactions are measured by both abnormal returns and cumulative abnormal returns obtained using the event study methodology. The event window for which the abnormal returns are measured includes a total of 11 days, starting five days before the announcement date and ending five days after the announcement date. Moreover, the multivariate analysis is performed by testing the cumulative abnormal returns with the OLS regression model.

The empirical results of the study indicate that the stock market reacts negatively to layoff announcements published by companies. On the date of the announcement, the average abnormal return for the full sample is -0,80 %. The results also indicate that the reason stated for the layoffs and the size of the company publishing the layoff announcement affect the reaction. Layoff announcements associated with declining demand or adverse market conditions cause a more negative stock market reaction than layoff announcements associated with improving efficiency. Layoff announcements of smaller companies, in turn, cause a more negative stock market reaction than layoff announcements of larger companies. The research findings may be valuable to investors in forming expectations concerning possible future layoff announcements and their impact on stock prices.

KEYWORDS: layoff announcement, stock market, abnormal return, market efficiency

VAASAN YLIOPISTO
Laskentatoimen ja rahoituksen yksikkö
Tekijä: Petteri Heinonen
Tutkielman nimi: Stock market reactions to layoff announcements in Finland 2010–2019
Tutkinto: Kauppatieteiden maisteri
Oppiaine: Rahoitus
Työn ohjaaja: Janne Äijö
Valmistumisvuosi: 2022 **Sivumäärä:** 88

TIIVISTELMÄ :

Tutkielman päätarkoituksena on tutkia Suomen osakemarkkinoiden reaktioita yritysten julkaisemiin lomautusilmoituksiin. Aiempi empiirinen tutkimus lomautusilmoitusten ja osakemarkkinoiden välisestä suhteesta on osoittanut, että osakemarkkinat reagoivat lomautusilmoituksiin pääsääntöisesti negatiivisesti. Koska aiempi empiirinen tutkimus on osoittanut myös, että tietyt lomautusten ominaisuudet saattavat vaikuttaa siihen, kuinka osakemarkkinat reagoivat, tarkoituksena on myös tutkia vaikuttavatko muun muassa lomautusten syy, lomautusten koko ja yrityksen koko osakemarkkinoiden reaktioon.

Tutkimuksen koko otos koostuu 384 lomautusilmoituksesta, jotka 77 Helsingin pörssissä listattua yritystä ovat julkaisseet vuosina 2010–2019. Lomautusilmoitukset jaetaan alaotoksiin, jotta voidaan tutkia edellä mainittujen lomautusten ominaisuuksien vaikutuksia reaktioon. Osakemarkkinoiden reaktiot mitataan sekä epänormaaleilla tuotoilla että kumulatiivisilla epänormaaleilla tuotoilla, jotka saadaan käyttämällä tapahtumatutkimuksen metodologiaa. Tapahtumaikkuna, jolta epänormaalit tuotot mitataan, sisältää 11 päivää, alkaen viisi päivää ennen ilmoituspäivää ja päättyen viisi päivää ilmoituspäivän jälkeen. Lisäksi suoritetaan monimuuttuja-analyysi testaamalla kumulatiiviset epänormaalit tuotot OLS-regressiomallilla.

Tutkimuksen empiiriset tulokset osoittavat, että osakemarkkinat reagoivat negatiivisesti yritysten julkaisemiin lomautusilmoituksiin. Koko otoksen keskimääräinen epänormaali tuotto ilmoituspäivänä on -0,80 %. Tulokset osoittavat myös, että lomautuksille ilmoitettu syy ja lomautusilmoituksen julkaisevan yrityksen koko vaikuttavat reaktioon. Lomautusilmoitukset, jotka liittyvät laskevaan kysyntään tai epäsuotuisiin markkinaolosuhteisiin, aiheuttavat negatiivisemman osakemarkkinareaktion kuin lomautusilmoitukset, jotka liittyvät tehokkuuden parantamiseen. Pienempien yritysten lomautusilmoitukset aiheuttavat puolestaan negatiivisemman osakemarkkinareaktion kuin suurempien yritysten lomautusilmoitukset. Tutkimuksen löydökset saattavat olla arvokkaita sijoittajille heidän muodostaessaan odotuksia mahdollisista tulevaisuuden lomautusilmoituksista ja niiden vaikutuksesta osakkeiden hintoihin.

AVAINSANAT: lomautusilmoitus, osakemarkkinat, epänormaali tuotto, markkinatehokkuus

Table of contents

Figures

Tables

1 Introduction

Layoffs are an effective way for companies to cut costs, and layoffs are particularly common in countries where employee wages and producing costs account for a significant portion of a company's total costs. Such high cost producing countries are, among others, the Nordic countries, including Finland. The empirical research of layoffs has shown that there are several reasons for layoffs of companies, and employees are laid off when the economy is in steady growth as well as when the economy is in recession. The layoffs that occur when the state of the economy is steady are associated with the most important function of the company, that is, maximizing the shareholder value. Thus, such layoffs may not be necessary for the company to survive, but the layoffs allow the company to cut costs and improve efficiency, which in turn enable the maximization of the shareholder value. On the other hand, during an economic downturn, companies lay off employees to survive and continue to operate in adverse market conditions.

In Finland, the annual number of employees laid off permanently has varied greatly during the period 2010–2019. After the financial crisis, the number of employees laid off permanently declined by more than a half compared to the previous year to less than 10 000. Over the next two years, the number of employees who lost their jobs increased. In 2012, the number of employees laid off permanently was the highest in the entire period, when the number of employees who lost their jobs exceeded 15 000 in Finland. After the year 2012, the number decreased for six consecutive years until the year 2018, when the number was the lowest in the period, with only around 3 400 people losing their jobs. In the last year of the period, the number doubled, as the companies reduced their workforce by a total of around 6 800 employees. (SAK, 2020.) Although the trend in 2013–2018 was downward and the number of 6 800 in 2019 is less than half of the peak in 2012, the overall situation does not appear to be getting better. Over the last two years, there has been almost daily news in media of layoff announcements published by companies, as the coronavirus pandemic and the restrictions it has brought have caused a large number of companies adverse market conditions and thus financial difficulties.

Although layoffs of the companies have been examined for over more than five decades, it was not until the 1990s that research into the economic impact of layoff announcements began. Previous research focused mainly on the impact of layoff announcements on employees and the background of the layoffs. However, Worrell, Davidson, and Sharma (1991) are among the first to examine the impact of layoff announcements on the market value of the company. In the paper, Worrell et al. (1991) examine the impact of 194 layoff announcements on stock prices in the U.S stock market during the period 1979–1987. They find that layoff announcements negatively impact the market value of the company. Moreover, the authors find that the reason stated for the layoffs impacts on how the stock market reacts to layoff announcements. The reaction is observed to be more negative if the layoffs are due to financial distress than if the layoffs are due to restructuring. The paper of Worrell et al. (1991) laid the foundation for future research, and the relationship between layoff announcements and stock prices has been studied quite extensively. However, the findings of previous literature are not entirely in agreement on the reaction of the stock market, encouraging further research on the subject.

The theory of market efficiency is essentially related to the examination of the relationship between layoff announcements and stock prices. The efficient market hypothesis states that the stock market should react immediately to new public information without delay. Therefore, according to the theory of market efficiency, when a company publishes a layoff announcement, the information contained in the layoff announcement should be reflected in the stock price on the date of the announcement. (Fama, 1970.) Thus, by examining how the stock market reacts to layoff announcements using the event study methodology, the indications of whether the market is efficient or whether inefficiencies occur in the market are also obtained.

1.1 Purpose of the study and hypotheses

The main purpose of the study is to examine the reaction of the Finnish stock market to layoff announcements in the period 2010–2019. The layoff announcements published by companies listed on the Nasdaq Helsinki are under examination. The layoff announcements refer to companies' stock exchange releases announcing the commencement of co-determination. In the study, the purpose is also to examine whether the reason stated for layoffs affects how the stock market reacts to layoff announcements, i.e., whether the reaction is positive or negative. Moreover, the purpose is to examine whether certain characteristics of the layoffs, such as layoffs size, affect the magnitude of the reaction.

The hypotheses of the thesis have been formed based on the findings of previous studies. The previous studies on the subject and their findings are discussed in chapter four. The hypotheses of the thesis are presented below.

H_1*: The layoff announcements cause a negative stock market reaction.*

The majority of previous studies have shown that layoff announcements cause a negative stock market reaction. Among others, for example, Worrell et al. (1991), Lee (1997), Hillier, Marshall, McColgan & Werema (2007), and Kunert, Schiereck & Welkoborsky (2017) have documented the negative reaction of the stock market to layoff announcements. Several studies have also found that the reason stated for layoffs affects the stock market reaction. For example, Gunderson, Verma & Verma (1997), Palmon, Sun & Tang (1997), Lee (1997), and Capelle-Blancard & Tatu (2012) have found that reactive layoffs that refer to layoffs for which the stated reason is declining demand or adverse market conditions cause a more negative stock market reaction than proactive layoffs that refer to layoffs for which the stated reason is improving efficiency. Thus, the second hypothesis is:

H_2: Reactive layoff announcements cause a more negative stock market reaction than proactive layoff announcements.

The previous literature also suggests that larger layoffs cause a more negative reaction than smaller layoffs. Among others, Worrell et al. (1991), Palmon et al. (1997), and Hilier et al. (2007) have documented that layoffs concerning a larger proportion of the company's employees cause a more negative reaction than layoffs concerning a smaller proportion of the company's employees. Thus, the third hypothesis is:

H_3: Larger layoffs cause a more negative stock market reaction than smaller layoffs.

The fourth hypothesis, in turn, is formed based on the research findings of Ursel & Armstrong-Strassen (1995), Lee (1997), Elayan, Swales, Maris & Scott (1998), and Hillier et al. (2007). In their studies, they have documented that the stock market reacts more negatively to the company's first layoff announcement than to the company's subsequent layoff announcements. Thus, the fourth hypothesis is:

H_4: The company's first layoff announcement causes a more negative stock market reaction than subsequent layoff announcements.

The fifth and the last hypothesis of this study is based on the research finding of Filbeck & Webb (2001), according to which the stock market reacts more negatively to the layoff announcements of smaller companies than to the layoff announcements of larger companies. They suggest that layoff announcements of smaller companies may be considered more informative since less information of smaller companies is available in the market. This information asymmetry, in turn, may cause a more negative reaction. Thus, the fifth hypothesis of the study is:

H_5: The layoff announcements of smaller companies cause a more negative reaction than the layoff announcements of larger companies.

1.2 Structure of the paper

This thesis is divided into two parts, the theory part, and the empirical part. After the introduction, the theory of market efficiency is discussed in the second chapter. The third chapter discusses the theory of determining the stock value and the stock return. This is followed by a review of previous studies on the relationship between layoff announcements and stock prices. More specifically, the chapter reviews the findings of previous studies on how the stock market reacts to layoff announcements published by companies. After this, the thesis proceeds to the empirical part. The fifth chapter reviews the data and the methodology used in the study. The study results are presented in the sixth chapter. Moreover, based on the study results, the hypotheses of the study are either accepted or rejected. The last chapter summarizes the main findings of the study, and the conclusions are presented. Finally, possible proposals for future research are presented.

2 Market Efficiency

Since this paper examines the stock market reaction to layoff announcements, it is necessary to go through the concept of market efficiency. One of the main functions of the financial markets is to allocate capital efficiently. According to Nikkinen, Rothovius, and Sahlström (2002: 80–81), financial markets can be allocatively efficient only when both internal and external efficiency is realized. As layoff announcements disclose new information to the market and this paper examines how the market reacts to layoff announcements, the focus is on external efficiency, since it refers to informational efficiency.

2.1 Efficient market hypothesis

The efficient market hypothesis developed by Fama (1970) states that the prices of securities such as stocks should fully reflect all information that is available in the market. In other words, according to the efficient market hypothesis, the financial markets are informatively efficient, and all market participants should have access to the information constantly. The efficient market hypothesis also states that in an efficient market it is impossible to consistently outperform the market and generate abnormal returns, as information that could be utilized in predicting stock performance is already reflected in current prices. Besides this, the stocks should be correctly priced in the case of an efficient market.

Since stock prices should reflect all information available in the market, prices should also change whenever new information becomes available. When a company publishes a layoff announcement, the information contained in the announcement should be immediately discernible in the stock price. Figure 1 below is an illustrative example of how the efficient market reacts to new positive information. The black line represents the efficient market situation, and as can be observed, the positive information is immediately reflected in the stock price. The gray line, in turn, describes the inefficient market situation, where the information is reflected in the stock price with a delay.

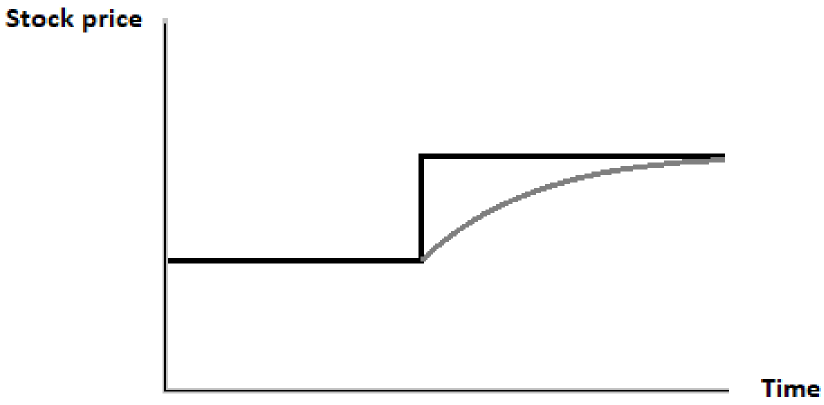

Figure 1. The efficient market reaction to new positive information. (Adapted from Knüpfer & Puttonen, 2014: 166.)

In the case of new negative information, in the efficient market, the stock price would decline immediately as the market reacts to the new information. In the inefficient market, the stock price would instead decline with a lag. When the market is inefficient, both over-reactions and under-reactions have also been observed in the market. These are mainly due to the fact that not all investors are completely rational, even if the efficient market hypothesis assumes so. (Shleifer, 2000: 10).

2.2 Perfect market

While researching market efficiency, Fama (1970) developed a concept of perfect market that ensures market efficiency when certain conditions are fulfilled. Even though the situation of the perfect market is not encountered in the financial markets, as a theoretical concept, it is nevertheless useful in evaluating the efficiency of the market. Fama (1970) represents three conditions that ensure adequate circumstances for an efficient market:

1) There are no transaction costs in the market, such as brokerage fees and taxes.
2) The information available is free of charge to all market participants, and all parties have access to the information.
3) All market participants agree on the effects of current information for the current price and distributions of future prices of each stock.

According to Fama (1970), the current price of stock completely reflects all the information available in the market if these conditions are fulfilled. When these conditions prevail in the market, it can be stated that the market is perfectly efficient.

Fama (1970) points out that while these three conditions ensure market efficiency, they are not necessary for an efficient market. That is, the market can be efficient even if not all conditions are fully met. The market can be efficient even if not all parties have access to information, as long as a sufficient number of market participants have access to information. Also, the existence of transaction costs does not necessarily mean that the market is inefficient. Fama (1970) notes that as long as transactors take into account all available information, the market can be efficient despite the transaction costs. Besides, disagreements between market participants about the effects of current information on current stock prices do not necessarily mean that the market is inefficient, as long as the investors are unable to make better estimates of available information than what are implicit in stock prices. Thus, the fact that information is not free of charge, transaction costs and disagreements over the impact of information do not directly indicate market inefficiencies but are potential sources of inefficient markets. These three potential sources exist in the financial markets at least to some extent.

2.3 Three forms of market efficiency

To facilitate the empirical study of market efficiency, Fama (1970) divides market efficiency into three forms: weak, semi-strong and strong form of market efficiency. The classification is based on the amount of information that is reflected in the stock prices. That is, there are differences between the forms in how much and what kind of information is reflected in stock prices.

The weakest level of market efficiency is the weak form. At a weak form of market efficiency, stock prices contain only information that is included in past stock prices. If the market is at the weak form, technical analysis is useless, meaning that investors can not generate excess returns by examining past stock prices. (Fama, 1970.)

For the market to be at a semi-strong form of market efficiency, in addition to past information, stock prices should include all publicly available information. Besides, the market should react to new publicly available information such as layoff announcements immediately with the right weight without over-reaction or under-reaction. (Fama, 1970.) The market reaction to public information is examined using the event study method, which is also used in this paper when examining the reaction of the stock market to layoff announcements. The event study methodology is discussed in more detail in chapter five.

The most efficient form of market efficiency is the strong form. In order for the market to be at the strong form, in addition to public information, prices must also include insider information. Thus, at the strong form of market efficiency, stock prices reflect all information. If the conditions of the strong form are met, then no one can achieve excess returns, not even by utilizing insider information. (Fama, 1970.) The fulfillment of strong form conditions can be examined by testing whether the professional mutual funds outperform the market (Brealey, Myers & Allen, 2014: 319–320).

The dependencies exist between the three forms. In other words, in order for the market to be at the semi-strong form, the conditions of the weak form must also be met. Correspondingly, if the market is at the strong form of market efficiency, the market must also meet both weak form and semi-strong form conditions. (Fama, 1970.) The figure 2 illustrates the dependencies between the three forms of market efficiency.

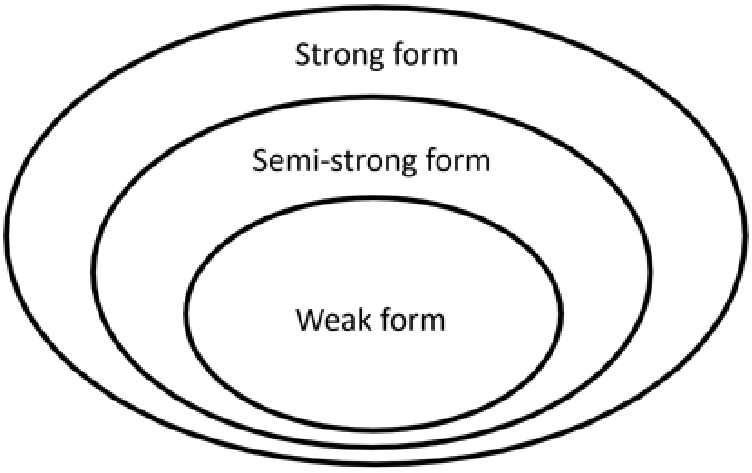

Figure 2. The forms of market efficiency and the dependencies between the forms. (Adapted from Nikkinen et al., 2002: 84.)

Fama (1970) points out that financial markets that meet the conditions for strong form market efficiency are hardly found in real life, and the empirical findings of several studies support this view. According to Copeland, Weston, and Shastri (2005: 361, 392), empirical evidence shows that the financial markets do not meet the strong form of market efficiency, but only conditions for the weak and the semi-strong form of market efficiency. This indicates that insiders can earn excess returns by utilizing insider information, even though the use of insider information in trading is illegal.

2.4 The concept of random walk

The concept of random walk dates back to the 19th century, when Jules Regnault introduced the concept in his book in 1863. At that time, however, the subject did not arouse greater interest, not even though it was developed further in Louis Bachelier's thesis in 1900. It was not until 1953 that a wider interest in the random walk concept arose due to the paper of Maurice Kendall. (Brealey, Myers & Allen, 2014: 314.)

In the paper, Kendall (1953) examines the behavior of stock and commodity prices, assuming that prices would follow certain patterns. Examining the price-series, Kendall (1953) finds that the assumed patterns are more unsystematic, and, in fact, the prices of stocks and commodities do not follow any particular pattern. He also notes that if some systematic effects are found, the random changes are so large that they cover up the systematic effects. Moreover, according to Kendall (1953), the weekly data behaves so wanderingly that it is virtually impossible to predict price movements for a week ahead.

A decade later, the random walk hypothesis was developed by Fama (1965). According to the random walk hypothesis, the future development of stock prices is not at all dependent on past price changes. That is, the random walk hypothesis suggests that stock prices change randomly, and the future price movements are thus unpredictable. Samuelsson (1965) proved the validity of the hypothesis with an empirical test. In the paper, Samuelsson (1965) substantiates that the prices may go up or down with equal probability on the next day, regardless of the previous price changes. He also notes that the independence of consecutive price movements refers to market reacting quickly to new information, which makes the market efficient.

The realization of the random walk in the stock market has been studied by several researchers and the results are fairly contradictory. Lo and MacKinlay (2002) find that there is significant autocorrelation in stock price movements, indicating that past price changes significantly explain future price changes. Malkiel (2007), in turn, notices the existence of a momentum effect in the stock market. If stock prices would follow a random walk, no such findings should be found. Thus, these findings speak against the existence of the random walk in the stock market. Narayan and Smith (2005) find evidence to support the existence of the random walk. They discover that stock prices follow the random walk in 20 countries out of 22 studied countries during the period 1991–2003. The countries where stock prices are not observed to follow the random walk are New Zealand and Mexico.

2.5 Information asymmetry and agency problems

Information asymmetry generally refers to a situation where the amount or quality of information available to all parties is not equal. Hence, the problem of information asymmetry is caused by the fact that, for example, one party has more information than the other party. (Copeland et al., 2005: 415.)

Akerlof (1970) illustrates asymmetric information with an example of the automobiles market. He presents a simplified model of the automobiles market with only four different types of cars for sale: good and bad used cars and good and bad new cars. The problem of asymmetric information arises when a potential buyer makes a purchase decision. The buyer cannot know the true value of the cars, unlike the seller, who knows the true value of the car that the buyer is considering buying. The true value of a car, i.e., whether the car is good or bad, is only revealed to the buyer after using the car for some time. Thus, the information asymmetry leads to cars of different quality are sold at the same price. In his example, Akerlof (1970) also points out that the information asymmetry may also lead to good cars not being sold at all. This is due to sellers having no incentive to sell good cars when they get the same price for cars of lower quality.

Agency problems are related to conflicts between the aims of company managers and shareowners. In agency theory, company managers are known as agents and shareholders as principals. When agents work for principals, agency problems may occur due to differing goals between managers and shareowners. For example, an agent may reject a risky investment that would advance maximizing the shareholder value to secure own position, although the agent has been hired to maximize shareholder value. Thus, the problem arises when both the agent and the principal are maximizing their own benefit. If the agent does not act in the best interests of the principal, agency costs may arise. (Brealey et al., 2014: 12–13.) According to Brealey et al. (2014: 13), agency costs arise to the shareholders when they oversee and possibly limit the actions of the manager, who does not act to maximize the value of the company.

When a company publishes a layoff announcement, the information asymmetry may arise. For example, regarding the real motives of the layoffs, information asymmetries may occur, as it can be assumed that the managers have more or better information than shareholders. In addition to information asymmetry, agency problems may also arise concerning the layoff decisions of a company. Company managers may make layoff decisions that may not be directly in the best interests of shareholders. For example, managers might not make adequate layoff decisions from the perspective of efficiency optimization when thinking in their interest, even if the efficiency improvement would advance maximizing the shareholder value. The emergence of agency problems is significantly influenced by the ownership structure of the company, and in diffusely owned companies where the ownership and the management are separated, the problems are more apparent when compared to family-owned companies (Jensen & Meckling, 1976).

3 Stock Valuation and Return

In addition to the market efficiency discussed earlier, another important theoretical framework when examining the impact of layoff announcements on stock prices is stock valuation and determination of stock return. This chapter reviews how the stocks are valued and how the return of the stock is determined. The first section presents three different valuation models to find out which factors affect the value of stock. The second part, in turn, presents three models that seek to explain how stock returns are determined and which factors affect stock returns.

3.1 Stock valuation models

The first stock valuation model to be presented is the dividend discount model, also known as DDM, developed by John Williams in 1938. The dividend discount model is one of the most common models in valuating stocks. The formula for the dividend discount model is represented in equation 1 (Williams, 1938).

$$P_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \cdots + \frac{D_t}{(1+k)^t} \quad (1)$$

Where: P_0 = present value of the stock,
D_t = dividend at time t,
k = expected return of the investment.

As can be seen from the formula, according to the dividend discount model, the intrinsic value of the stock is defined as the present value of future dividends. It should also be noted that although D_t in the formula denotes dividend at time t, in reality, it denotes an estimate of future dividends because uncertainty always relates to the future and thus, the number of future dividends cannot be known. Using estimates is also quite problematic, because if the estimates are miscalculated, it significantly affects the intrinsic value of the stock. For example, if the estimates of future dividends are slightly overestimated, the intrinsic value of the stock will be higher than it should be, that is, the stock is overvalued. Another factor that makes it difficult to use the dividend discount model is that the estimates of future dividends should be made for an indefinite future. Making accurate estimates for an indefinite future is, in practice, difficult, if not even impossible. (Bodie et al., 2014: 595–596.)

The second model is the constant growth dividend discount model, which is a simplified version of the standard dividend discount model. The constant growth dividend discount model is also referred as the Gordon's growth model, as it was developed by Myron J. Gordon in 1956 to modify the DDM more practical. (Bodie et al., 2014: 596–597.) The Gordon's growth model is based on three assumptions, which are:

1) the flow of dividends is perpetual,
2) the dividends grow at a constant rate, g,
3) the expected return of the investment, k is greater than the growth rate, g.

Equation 2 presents the formula of the Gordon model (Gordon & Shapiro, 1956).

$$P_0 = \frac{D_1}{k - g} \tag{2}$$

Where: g = constant growth rate of dividends.

Thus, as can be seen from the formula, the Gordon's growth model suggests that instead of having to estimate dividends for an indefinite future, a constant growth rate of dividends is used. Using the constant growth rate, it is assumed that dividends will grow steadily to perpetuity. Although the growth rate of dividends is rarely constant in practice, however, the formula provides information how different factors affect the value of the stock. According to the Gordon's growth model, the value of the stock is positively affected by the higher dividends, the lower the expected return of the investment, and the higher the growth rate of the dividends. On the other hand, if, for example, the growth rate of dividends decreases or the expected return of the investment increases, the value of the stock decreases. While looking at the formula, it is also noticeable that if dividends were not expected to grow at all in the future, then the dividend flow would be simple a perpetuity. (Bodie et al., 2014: 596–599.)

However, not all companies pay dividends, which is why the two dividend-based models presented above cannot be applied to the valuation of all stocks. If the company does not pay dividends, the free cash flow (FCF) model can be used to value the stock. In principle, the free cash flow model works in the same way as the dividend discount model, but instead of the present value of the future dividends, the present value of the future free cash flows is calculated. Free cash flow refers to the cash flow generated by a company after all operating expenses, taxes, and interest expenses, and it can be used, for example, for investments. The formula for the free cash flow model is presented in equation 3. (Nikkinen et al., 2002: 152–153.)

$$P_0 = \frac{FCF_1}{1+k} + \frac{FCF_2}{(1+k)^2} + \frac{FCF_3}{(1+k)^3} + \cdots + \frac{FCF_t}{(1+k)^t} \quad (3)$$

Compared to dividend-based models, the free cash flow model is considered to work better because the dividend policy of companies does not affect the application of the model. However, there are also problems with the application of the FCF model, for instance, in cases where the amount of investments is large and varies significantly from year to year and when the free cash flow is negative. In these cases, forecasting future free cash flows becomes even more difficult, and this can lead to using incorrect estimates, which in turn can distort the present value of the stock. Therefore, the FCF model should be used if it can be assumed that the company uses a relatively same amount of money on investments from year to year, and that the cash flow remains at a relatively same level from year to year. (Nikkinen et al., 2002: 152–154.)

3.2 Determination of stock return

Several models have been developed in the literature of finance to determine the return of a financial asset. Of these, one of the best known is the capital asset pricing model, also known as CAPM. The CAPM was developed in the 1960s on the foundation of Harry Markovich's modern portfolio theory by William Sharpe, John Lintner, and Jan Mossin. However, William Sharpe is considered the most important contributor, and his paper published in 1964 is the most renowned.

Bodie et al. (2014: 304) summarize the simplifying assumptions regarding both the individual behavior and the market structure on which the CAPM relies:

1) All investors are rational.
2) The planning horizon of all investors is single a period.
3) The expectations of all investors are homogenous.
4) There are no taxes in the market.
5) There are no transaction costs in the market.
6) There is no information asymmetry in the market.
7) Short selling is possible, money can be borrowed or lent at a risk-free rate, and all assets trade on public exchanges and are publicly held.

As can be seen, the assumptions are theoretical and not most of the assumptions are met in real life. Nevertheless, for the CAPM to function, these assumptions must be met. When the assumptions are valid, according to the CAPM, the expected return of a security is determined as follows (Bodie et al., 2014: 297):

$$E(R_i) = R_f + \beta_i \left[E(R_m) - R_f \right] \quad (4)$$

Where: $E(R_i)$ = the expected return of the asset i,

R_f = the risk-free rate,

β_i = the beta of the asset i,

$E(R_m)$ = the expected return of the market portfolio.

Thus, according to the model, the expected return of a security consists of a risk-free return and a risk premium. The risk premium of security is obtained by multiplying the market risk premium with beta of the security. The security's risk premium thus determines how much the expected return of the security differs from the risk-free return. (Sharpe, 1964.)

The security's beta refers to the systematic risk of the security. In other words, beta reflects the sensitivity of how much the return of an individual security fluctuates relative to the return of the market portfolio. Since the risk-free rate and the market risk premium are equal for all securities, beta is the only factor that induces different expected returns of securities. Thus, the expected return of a security is determined directly by the systematic risk of the security. (Sharpe, 1964.)

The equation of the capital asset pricing model determines the security market line (SML) on which all securities should be located in equilibrium. The SML can be used to examine whether securities are properly priced regarding return and risk. If a security is not located on the security market line, the security is not properly priced, as the expected return is either too high or too low related to the risk. Securities located below the SML are overpriced as the expected return is too low related to the risk. Correspondingly, securities above the SML are underpriced as the expected return is too high related to the risk. (Sharpe, 1964.)

The CAPM has received a lot of criticism for the practical functionality of the model. Fama and French (1993) developed the three-factor model because the empirical findings have shown that beta solely is not able to predict future stock returns, contrary to what the CAPM suggests. Fama and French (1993) expand the CAPM by adding size (SMB) and value (HML) factors alongside the original market factor. In the model, the size factor (small minus big) depicts the difference between the portfolio returns of small and large companies. The return difference is obtained by subtracting the portfolio return of large companies from the portfolio return of small companies. The value factor (high minus low), in turn, depicts the difference between the portfolio returns of companies with high book-to-market ratio and companies with low book-to-market ratio. The return difference is obtained correspondingly by subtracting the portfolio return of low book-to-market companies from the portfolio return of high book-to-market companies. The formula for the three-factor model of Fama and French is presented below in equation 5.

$$R_i - R_f = a_i + b_i(R_M - R_f) + s_i SMB + h_i HML + e_i \tag{5}$$

Where: R_i = the return of stock i,

R_f = the risk-free rate,

b_i = sensitivity of stock i to market factor,

$(R_M - R_f)$ = the market factor,

s_i = sensitivity of stock i to size factor,

SMB = the size factor,

h_i = sensitivity of stock i to value factor,

HML = the value factor,

a_i = the intercept,

e_i = the error term.

The previous studies act as incentives in the creation of the model, as the results of previous studies have shown that small companies tend to outperform large companies and that companies with high book-to-market ratio tend to outperform companies with low book-to-market ratio. The study results of Fama and French (1993) indicate that besides market return, the size of the company and book-to-market ratio have a significant impact on determining the stock return of the company. Therefore, taking these risk factors into account, more accurate forecasts of future stock returns can be made.

In order to capture stock returns better, Fama and French (2015) expand the three-factor model to the five-factor model. Alongside the three original factors, the factors to be added to the model are the profitability (RMW) and the investment (CMA) factors. The profitability factor (robust minus weak) depicts the difference between the portfolio returns of companies with robust profitability and companies with weak profitability. The investment factor (conservative minus aggressive), in turn, depicts the difference between the portfolio returns of companies with low investment level and companies with high investment level. The formula for the five-factor model is shown as follows:

$$R_i - R_f = a_i + b_i(R_M - R_f) + s_i SMB + h_i HML + r_i RMW + c_i CMA + e_i \qquad (6)$$

Where: r_i = sensitivity of stock i to profitability factor,

RMW = the profitability factor,

c_i = sensitivity of stock i to investment factor,

CMA = the investment factor.

4 Literature Review

The impact of the layoff announcements on the stock prices of companies has been studied since the beginning of the 1990s, and most of the studies have focused on the stock market of the United States. In addition to the United States, several studies related to the layoff announcements and the stock market reaction have been conducted in both the UK and Canadian markets. In this chapter, the previous studies, and the findings of those are covered. The studies are reviewed in chronological order, starting with the pioneering paper of Worrell et al. (1991), which constructed the framework for future research. The chapter concludes with a summary of previous studies, presented in tabular form. This chapter lays the foundation for this thesis.

4.1 Prior literature

Worrell et al. (1991) examine the relationship between layoff announcements and stock prices in the U.S stock market in the years 1979 to 1987. The study data contains a total of 194 layoff announcements. The main research question of the study is to find out whether the layoff announcements cause abnormal returns in the stock market. In addition to this, it is also being examined whether the reason given for the layoff announcement affects the reaction of the stock market, and whether the size of the layoffs affects the reaction of the stock market.

The study results of Worrell et al. (1991) indicate that layoff announcements cause a significant negative stock market reaction. In the 11 day's event window ([-5, +5]), the stock prices decrease 1,42 % on average when looking at the entire sample. The finding is statistically significant at the 0,1 % significance level. The results also show that the reported reason influences the stock market reaction. According to the results, the market reaction is more negative when the reported reason for the layoffs is financial distress compared to the situation where the reason for the layoffs is stated to be restructuring. The average abnormal return for the event window (-5, +5) is -2,46 % when the reason is financial distress. When the reason is restructuring, statistically significant abnormal returns are not observed.

Regarding the size of the layoffs, the results show that the layoff size influences the stock market reaction, as larger layoffs cause a more negative reaction than smaller layoffs. Moreover, the results indicate that if the layoffs are permanent, the abnormal returns are more negative than if the layoffs are only temporary. Worrell et al. (1991) also discover that for some layoff announcements, information has been leaked to the market before the date of the event. The authors of the study conclude that the stock market reaction to the layoff announcements is seen as negative overall, and thus it is assumed that negative abnormal returns will continue to occur in the future when new layoff announcements are published.

Lin and Rozeff (1993), in turn, examine the relationship between the stock returns and operating decisions such as layoffs, pay cuts, and operation closings. The relationship was examined in the U.S market in the years 1978 to 1985, and a total of 383 layoff announcements issued by companies were under investigation. The authors formed an efficiency hypothesis (pure efficiency) as well as a declining demand hypothesis (decreased demand) to determine the real causes of layoffs.

According to the study of Lin and Rozeff (1993), the layoffs are due to declining demand and not improving efficiency. Moreover, the cost-cutting decisions take place after a significant decline in stock prices. The study suggests that the market tends to anticipate layoff announcements, as investors are aware that declining demand will decrease stock prices, after which cost-cutting decisions are expected to occur.

Regarding to stock market reaction, Lin and Rozeff (1993) find that the reaction to layoff announcements is negative. The study results indicate that abnormal returns are most negative when layoffs are permanent and concern full-time employees. Layoff announcements concerning permanent layoffs of part-time employees or temporary layoffs of full-time employees also cause negative abnormal returns, but not as large. Moreover, according to the results, the stock market reaction is considerably more negative for the first announcement related to layoffs. The later announcements also cause a negative stock market reaction, albeit a less negative reaction. Altogether, like the findings of Worrell et al. (1991), the results of Lin and Rozeff (1993) speak in favor of a negative stock market reaction associated with layoff announcements.

Ursel and Armstrong-Strassen (1995) are among the first to study the relationship between the layoff announcements and the stock returns in the Canadian market. As the research data, Ursel and Armstrong-Strassen (1995) utilize a total of 137 layoff announcements that has been published during the recessionary period 1989–1992 by 57 different companies. In addition to assessing the impact of layoff announcements on stock prices, the study aims to model the estimated effect as a function of variables such as the size of the announced layoffs. In order not to get biased research results, the authors control for companies' other possible announcements that occur close to the date of the layoff announcement.

Like the results of Worrell et al. (1991) and Lin and Rozeff (1993), the study results of Ursel and Armstrong-Strassen (1995) also indicate that the reaction of stock to layoff announcements is overall negative. Ursel and Armstrong-Strassen (1995) find similar evidence regarding the relationship between layoffs size and magnitude of the reaction as Worrell et al. (1991) since the results show that larger-scale layoffs cause a more negative reaction. The study also discloses that there are differences in the magnitude of the reaction between the company's first layoff announcement and subsequent layoff announcements. The results indicate that the decline in the stock price of the company that issued the layoff announcement is greater if the layoff announcement is the company's first. Subsequent layoff announcements issued by the company also cause the decline in the stock price, but in this case, the decline is smaller. Thus, investors react more negatively to the company's first layoff announcement.

Regarding other announcements occurring close to the date of the layoff announcements, the authors of the study point out that it is important to control for other announcements published, as they discover that other announcements have an impact on abnormal returns on the day of the layoff announcement. According to Ursel and Armstrong-Strassen (1995), approximately 10 % of the estimated abnormal returns is due to other announcements. That is, when other announcements are controlled, the initial abnormal returns are reduced by about 10 %. Ursel and Armstrong-Strassen (1995) conclude that layoff announcements result in statistically and economically significant losses to shareholders, which is why managers should be careful when considering layoffs.

Iqbal and Shetty (1995) study the reaction of the stock market to layoff announcements in the U.S market in the years 1986–1989. The sample contains a total of 187 layoff announcements, of which, however, 38 announcements are reduced because companies have published other announcements in the event window [-5, 0] that may affect the results as Ursel and Armstrong-Strassen (1995) have shown. Thus, the final sample contains 149 layoff announcements. Besides examining the stock market reaction to layoff announcements, Iqbal and Shetty (1995) focus on examining the financial conditions of companies that lay off their employees.

According to the study results of Iqbal and Shetty (1995), the connective factor for companies that lay off their employees is the low rate of return on equity (ROE). The authors find that the average return on equity of the companies in the year before the layoff is 11,2 %, while in the year of the layoff the corresponding ratio is only 0,5 %. In other words, layoffs have been preceded by an average 10,7 % decrease in ROE of companies compared to the previous year. Thus, the authors suggest that layoffs are generally seen as responses to poor performance to maximize the value of the company.

Regarding the stock market reaction, Iqbal and Shetty (1995) find that layoff announcements cause a negative reaction in general. According to the study, abnormal returns in the event window (-1, 0) are on average -0,3 % when considering the entire sample. Besides the economic significance, the finding is also statistically significant at the 5 % significance level. The finding of a negative market reaction is consistent with the previous literature since, as previously shown, a generally negative market reaction has been observed in all prior studies. In the study, it is also observed that the stock market reaction is more negative for financially strong companies than for financially weak companies, which contradicts the findings of Worrell et al. (1991), as Worrell et al. (1991) discover that the reaction is more negative for companies with financial distress. As a possible explanation, Iqbal and Shetty (1995) suggest the potential benefit hypothesis, according to which financially weak companies benefit more from layoffs than financially strong companies. The authors point out that the shareholders of financially strong companies experience that layoffs do not generate future benefits, which is why they react more negatively to layoff announcements than the shareholders of financially weak companies, who in turn experience that layoffs are beneficial considering the future of the company. As a consequence of a strong negative reaction observed, Iqbal and Shetty (1995) propose that managers of financially strong companies, in particular, should look for alternatives such as reductions in working hours for layoffs.

Like Ursel and Armstrong-Strassen (1995), Gunderson et al. (1997) study the relationship between layoff announcements and stock returns in the Canadian market in their paper. The study covers the period 1982–1989, and the data consists of 214 layoff announcements published by major Canadian companies. Gunderson et al. (1997) divide layoff announcements into reactive and proactive layoff announcements based on the information contained in the announcements. They note that reactive layoff announcements are generally seen in the market as bad news and proactive layoff announcements in turn as good news. This is because reactive announcements refer to layoff announcements where the stated reasons for layoffs are related to negative circumstances such as the unprofitability of the business or inadequate demand. Whereas proactive announcements refer to layoff announcements where the stated reasons are related to proactive actions aimed at, for example, preparing the company for changing conditions. The classification is done to examine whether the market can distinguish good news from bad news, that is, whether the reaction of the stock market differs between these two different types of layoff announcements.

Like previous studies, Gunderson et al. (1997) find the stock market reacting negatively to layoff announcements. According to the study, the cumulative average abnormal return for the three-day event window (-1, +1) are -0,47 % for the entire sample. The stock prices of companies that published layoff announcements, on the other hand, decline by an average of 0,28 % on the day of the event. Both findings for the entire sample are statistically significant. As most of the abnormal returns caused by layoff announcements occur on the event day or the following day, the market appears to respond relatively quickly to new information. Moreover, the abnormal returns are not observed on the day before the event, which in turn indicates that the market is unable to anticipate the new information.

Although the market is unable to anticipate the new information, the market seems to be able to distinguish good news from bad news, as Gunderson et al. (1997) assume. The results indicate that proactive layoff announcements cause a positive stock market reaction while reactive layoff announcements cause a negative reaction. The cumulative average abnormal return for the three-day event window (-1, +1) are 0,32 % for proactive layoff announcements, whereas the corresponding figure for reactive layoff announcements is -0,79 %. Of these, however, only the result of reactive layoff announcements is statistically significant. The result is statistically significant at the 0,1 % significance level. The result of proactive layoff announcements is slightly insignificant. The results of Gunderson et al. (1997) also show that the stock market reacts more negatively to layoff announcements concerning entire workforce than to layoff announcements concerning part of the workforce. A more negative reaction is also observed for companies whose share of wage costs to total costs is below the median indicating that investors may not find it necessary to cut wage cost, at least in the form of layoffs, while the wage costs are already at the low level.

Palmon et al. (1997), for their part, examine the impact of layoff announcements on stock prices in the U.S market in the years 1982–1990. In addition to studying the relationship between layoff announcements and stock prices, the authors focus on examining the financial performance of companies after the publication of layoff announcements. The research sample consists of 140 layoff announcements published by U.S companies. Palmon et al. (1997) have a similar approach to studying the effect as Gunderson et al. (1997) because they also classify layoff announcements into proactive and reactive announcements based on the reason given for the layoffs. Proactive layoff announcements refer to layoff announcements where the stated reasons for the layoffs are related to improving efficiency, and, in turn, reactive layoff announcements refer to layoff announcements where the stated reasons for the layoffs are related to declining demand.

Palmon et al. (1997) find evidence that the stated reasons for layoffs impact how the market reacts to layoff announcements, as differences in abnormal returns are observed between proactive and reactive layoff announcements. The results show that for proactive layoff announcements, the cumulative average abnormal return for the three-day event window (-1, +1) is 0,80 %. This indicates that the market reacts positively to layoff announcements if the reason for the layoffs is stated to be efficiency improving. On the other hand, the results indicate that the market reacts negatively to layoff announcements if the stated reason for layoffs is declining demand. For reactive layoff announcements, the cumulative average abnormal return is -2,23 % on the three-day event window. Both findings are statistically significant at the 1 % significance level. Despite that Gunderson et al. (1997) found a positive relationship between proactive layoff announcements and stock market reaction, this is the first study to capture a statistically significant positive market reaction.

While examining the financial performance of companies after the publication of layoff announcements, Palmon et al. (1997) find that the reasons given for the layoffs affect profitability measures such as return on assets (ROA) and return on equity (ROE) ratios. During the three years period before the layoff announcements, the average of the reactive sub-sample for both ROA and ROE exceeds the average of the proactive sub-sample. Also, in the year of layoff announcements, the reactive sub-sample has a higher average ROA and ROE. After this, however, the situation changes, as the results indicate that in the three following years, the profitability measures of the proactive sub-sample are on average higher than those of the reactive sub-sample. This suggests that in addition to the fact that layoff announcements affect the value of the company, layoff announcements also affect the future profitability of the company.

The study of Lee (1997) focuses on examining the impact of layoff announcements on stock markets in the U.S and Japan to compare potential country-specific differences in stock market reactions. The research covers the period 1990–1994, and there are a total of 358 layoff announcements under investigation, 300 from the United States and 58 from Japan. Lee (1997) finds that the market reacts to layoff announcements negatively in both the United States and Japan. In the U.S, the market reacts more negatively than in Japan, as the cumulative average abnormal return is -1,78 % on the five-day (-2, +2) event window, while in Japan the corresponding abnormal return is -0,56 %. According to Lee (1997), one possible explanation for the difference in the intensity of the stock market reaction is considerable differences in corporate governance practices between American and Japanese companies.

Lee (1997) also finds that certain characteristics of layoffs, such as duration and size, affect the intensity of the stock market reaction. The results reveal that in the United States, the stock market reacts more negatively to layoff announcements if the layoffs are permanent. In the case of permanent layoffs, the cumulative abnormal return on the five-day (-2, +2) event window is, on average, -2,00 %. For temporary layoffs, the reaction is positive, albeit statistically insignificant. In terms of layoff size, the results reveal that the larger the layoffs, the more negative the stock market reaction. In Japan, the size and the duration of layoffs are not observed to affect the intensity of the reaction.

Moreover, the study results of Lee (1997) indicate that, in the United States, for reactive layoffs, the stock market reacts more negatively than for proactive layoffs. The cumulative average abnormal return for reactive layoff announcements is -2,72 % on the five-day event window, whereas for proactive layoff announcements, the abnormal return is only slightly negative (-0,24 %) and statistically insignificant. Hence, this study also finds evidence that the reason for the layoffs has an impact on how the stock market reacts. Like, e.g., Ursel and Armstrong (1995), Lee (1997) also observes that the company's first layoff announcement causes a more negative reaction than subsequent layoff announcements published by the company. According to the results, the first layoff announcement causes approximately five times greater reaction. Besides, it is observed in the study that the industry's first layoff announcement causes a significantly more negative reaction than subsequent ones.

Elayan et al. (1998), in turn, examine the relationship between layoff announcements and the stock market in the United States in the years 1979 to 1991. The sample consists of a total of 646 layoff announcements collected from The Wall Street Journal. The study is based on two hypotheses formed by the authors: efficiency and declining investment opportunities hypotheses. The authors state that if investors perceive layoffs as a way to improve efficiency, positive abnormal returns are expected to occur in connection with layoff announcements. On the other hand, if investors experience, that layoffs are detrimental to future growth or investment opportunities, negative abnormal returns are expected to occur.

The study results show that the stock market reacts negatively to layoff announcements. The cumulative average abnormal return is -0,64 % for the full sample on the two-day (-1, 0) event window. According to Elayan et al. (1998), the finding is in line with the declining investment opportunities hypothesis. They suggest that investors perceive layoffs as reducing the company's future growth and investment opportunities. The results reveal that the reaction is statistically significantly negative only if the reason for the layoffs is related either unprofitability of operations or quarrel of labor management. When the reasons for the layoffs are related to restructuring or suspension of operations, the negative abnormal returns are statistically insignificant. Elayan et al. (1998) also find similar evidence as most of the previous studies regarding the impact of certain layoff characteristics on the intensity of the reaction. The results indicate that the stock market reacts more negatively to permanent layoffs than to temporary layoffs. The reaction is also found to be more negative for layoffs concerning a relatively larger proportion of the company's employees than for layoffs concerning a relatively smaller proportion of the company's employees. Moreover, the stock market is observed to react more negatively to the company's first layoff announcement than to subsequent ones.

Filbeck and Webb (2001) examine the relationship between layoff announcements and the stock market in the United States from 1990 to 1997 with a sample of 366 layoff announcements. According to the study, the stock market reacts generally negatively to layoff announcements. The cumulative average abnormal return for full sample is -1,24 % on the three-day (-1, +1) event window. Thus, the shareholder's wealth declines by an average of 1,24 % over those three days around the layoff announcement. Filbeck and Webb (2001) also study whether the size of a company and the size of layoffs have an impact on how strongly the stock market responds to layoff announcements. They find that when small companies publish a layoff announcement, the decline in stock price is greater. The stock price declines also as large companies publish a layoff announcement, but the decline is more moderate. The authors point out that the greater reaction for small companies may be due to information asymmetry, as significantly less information of small companies is available. This may lead to layoff announcements of small companies being perceived as more informative than layoff announcements of large companies, which in turn is reflected in a greater reaction. In terms of layoffs size, the results are similar to previous studies, as Filbeck and Webb (2001) find that the stock market reacts more negatively to layoffs concerning a larger percentage of the company's employees than to layoffs concerning a smaller percentage of the company's employees. Findings related to company size and layoff size affecting the magnitude of the reaction are obtained by OLS-regression, and the findings are statistically significant at a 1 % significance level.

Like all previous studies, Hillier et al. (2007) document a negative market reaction in their study when examining the relationship between layoff announcements and stock prices in the UK during the period 1990–2000. The results reveal that when considering the full sample of 322 layoff announcements, the stock price of the company that issued the layoff announcement declines 0,81 % on average over the three-day (-1, +1) event window. Hillier et al. (2007) note that the layoffs are the consequence of a long period of poor performance, and for example, indebtedness is found to have increased before the publication of the layoff announcement. The authors find that in addition to poor operational performance, the stock price has also performed poorly before the layoff announcement. Contrary to what Palmon et al. (1997) have shown, Hillier et al. (2007) do not observe a significant improvement in the company's operational performance after the layoff announcement regardless of the reason behind the layoffs.

Hillier et al. (2007) also investigate whether the stated reason for layoffs affects the stock market reaction. The announcements are divided into five different groups according to the reason for the layoffs, which are: reorganization, plant closure, cost cutting, loss-making operations and decline in demand. According to the results, the most negative reaction is caused by layoffs that are due to loss-making operations or plant closure. If the given reason is loss-making operations, the stock price of the company declines 2,34 % on average over the three-day (-1, +1) event window. Correspondingly, if the given reason is the plant closure, the stock price of the company declines 2,12 % on average. The layoffs for which the given reason is reorganization, cost cutting, or decline in demand, in turn, do not cause a statistically significant stock market reaction. In addition to initial division, the authors divide layoff announcements into proactive and reactive layoff announcements. Proactive layoff announcements include reorganization and cost cutting layoffs, and reactive layoff announcements include plant closure, loss-making operations, and decline in demand layoffs. The results indicate that reactive announcements cause a statistically significant decline in stock price (-1,46 %) over the three-day (-1, +1) event window, while proactive announcements cause a statistically insignificant positive reaction in stock price. In the study, it is also found that layoffs concerning more than 4,1 % (above sample median) of a company's employees cause a more negative stock market reaction than layoffs concerning less than 4,1 % (below sample median) of a company's employees. Layoffs of more than 4,1 % of employees cause, on average, 1,17 % decline in stock price over the (-1, +1) event window. The stock market reaction caused by smaller layoffs is also negative but statistically insignificant. Hillier et al. (2007) also observe that the first layoff announcement of companies has a more negative impact on stock prices than companies' subsequent layoff announcements, which is in line with the previous literature.

Contrary to all previous studies, the study of Capelle-Blancard and Tatu (2012) is the first in which statistically significant negative stock market reaction for the entire sample is not documented. While examining the impact of the 1605 layoff announcements on stock prices in Europe in the years 2002–2010, Capelle-Blancard and Tatu (2012) find that investors react negatively to the layoff announcements, but the reaction is minor and statistically insignificant. Instead, when examining the effect of the reasons for layoffs on how investors react to layoff announcements, the authors find both statistically significant positive and negative reaction. The results reveal that investors react positively to proactive layoffs and negatively to reactive layoffs. As in previous studies, proactive layoffs refer to layoffs that aim to improve efficiency, and reactive layoffs refer to layoffs that are done as a response to declining demand. Over the three-day (-1, +1) event window, the cumulative average abnormal return for proactive layoff announcements is 0,78 %, whereas, for reactive layoff announcements that is -0,88 %.

The results of the OLS regression confirm the results of univariate analysis, as the results indicate that there is a negative relationship between reactive layoff announcements and abnormal returns and a positive relationship between proactive layoff announcements and abnormal returns. The results of the multivariate analysis also indicate that there is a negative relationship between the first layoff announcement and abnormal returns. In other words, if the layoff announcement is the first of the company, it negatively affects abnormal returns surrounding the layoff announcement. A positive relationship, in turn, is observed between plant closure and abnormal returns. That is, if the layoff is due to plant closure, it has a positive effect on abnormal returns. (Capelle-Blancard & Tatu, 2012.)

Marshall, McColgan, and McLeish (2012) examine the reaction of the stock market to layoff announcements in the UK during both the upturn and the downturn of the stock market. The research period is divided into two periods: the upturn period of 2005–2006, when the market index increased by 33 %, and the downturn period of 2008 when the market index decreased by 32 %. The sample of the upturn period consists of 67 layoff announcements, while the sample of the downturn period consists of 76 layoff announcements. Thus, a total of 143 layoff announcements are under investigation. Marshall et al. (2012) examine the impact of layoff announcements on the stock market separately during the upturns and downturns to find out whether the stock market reacts differently to layoff announcements published under different economic conditions. The authors assume that during the upturn, the stock market reacts positively to layoff announcements and during the downturn, in turn, negatively.

The univariate analysis substantiates the authors' assumption, as the results indicate that the market reacts positively to layoff announcements during the upturn and negatively during the downturn. The results reveal that during the upturn period 2005-2006, layoff announcements cause 0,51 % cumulative abnormal returns over the event window (-1, +1). During the downturn period of 2008, in turn, the stock market reaction to layoff announcements is negative, with cumulative abnormal returns of -1,75 %. Moreover, Marshall et al. (2012) find that layoff announcements, for which the provided reason is economic conditions, cause a particularly positive reaction during the upturn and particularly negative reaction during the downturn. During the downturn, a particularly negative reaction is also observed concerning layoff announcements for which the provided reason is plant closure. The industry-specific comparison shows that during the upturn, the stock market reacts particularly positively to layoffs announcements of companies operating in the consumer products sector, while during the downturn the stock market reacts particularly negatively to layoff announcements of companies operating in banking and financial services and manufacturing sectors. The results of OLS regression also confirm that the stock market reaction to layoff announcements is significantly more negative during the downturn period of 2008 than during the upturn period of 2005–2006. (Marshall et al., 2012.)

The most recent study discussed in this section is a study of Kunert et al. published in 2017. In their study, Kunert et al. (2017) examine the impact of layoff announcements on stock prices in the renewable energy sector during the period 2005–2014. Thus, this is also the only study that focuses on one specific industry. The full sample consists of 65 layoff announcements, of which 37 are published by European companies, 25 by North American companies and 3 by Asian companies.

The results indicate that the stock market reaction to the layoff announcements is overall negative. Kunert et al. (2017) find that, when considering the entire sample, layoff announcements in the renewable energy sector cause, on average, a 2,99 % decline in the stock price on the day the layoff announcement is published. For the two-day event window (0, +1), the cumulative abnormal return is -5,08 %, suggesting that the negative stock market reaction continues the day after the publication day. Examining proactive and reactive layoffs separately, the authors find that the reaction is negative for both proactive and reactive layoffs. Thus, the reason for the layoffs does not affect the stock market reaction, which differs from previous cross-industrial studies, as most of the previous studies have found differences in the stock market reaction between proactive and reactive layoffs. During the two-day event window (0, +1), the cumulative abnormal return for proactive layoffs is -5,07 % while for reactive layoffs -5,09 %.

The univariate analysis also reveals that layoff announcements of European companies and solar companies have a particularly negative impact on stock prices. On the other hand, Kunert et al. (2017) do not find a clear relationship between the size of the layoffs and the intensity of the market reaction, in contrast to what is observed in previous studies. The results of OLS regression confirm that the stock market reaction is more negative for solar companies, as the dummy variable for solar companies is statistically significantly negative. For European companies, the results of OLS regression are inconsistent with the results of univariate analysis, as the dummy variable for European companies is negative but statistically insignificant. According to Kunert et al. (2017), the particularly strong negative stock market reaction observed in the study may be due to the fact that human capital is considered important in the renewable energy sector, and companies are highly dependent on it. Consequently, the investors perceive the layoffs as a detrimental action for the future of the company and thus react particularly negatively to layoff announcements.

4.2 Summary of previous studies

Table 1. Summary of previous research findings.

Research	**Market & research period**	**Sample size**	**Sample classification**	**Window**	**Results**
Worrell et al. (1991)	the US 1979–1987	194	Full sample Financial distress	(-5, +5) (-5, +5)	-1,42 % **** -2,46 % ****
Lin & Rozeff (1993)	the US 1978–1985	383	Temporary layoffs Permanent layoffs (part-time empl.)	(-1, 0) (-1, 0)	-1,29 % **** -2,12 % ****

			Permanent layoffs (full-time empl.)	(-1, 0)	-0,85 % **
Ursel & Armstrong-Strassen (1995)	Canada 1989–1992	137	Full sample First announcement	(0, +1) (0, +1)	-0,60 % *** -1,01 % **
Iqbal & Shetty (1995)	the US 1986–1989	149	Full sample Financially strong firm Financially weak firm	(-1, 0) (-1, 0) (-1, 0)	-0,30 % ** -0,50 % ** +1,40 % *
Gunderson et al. (1997)	Canada 1982–1989	214	Full sample Reactive layoffs Proactive layoffs	(-1, +1) (-1, +1) (-1, +1)	-0,47 % *** -0,79 % **** +0,32 %
Palmon et al. (1997)	the US 1982–1990	140	Reactive layoffs Proactive layoffs	(-1, +1) (-1, +1)	-2,23 % **** +0,80 % ***
Lee (1997)	the US Japan 1990–1994	300 58	Full sample (US) Full sample (Japan) Reactive layoffs (US) Proactive layoffs (US) First announcement (US) Subsequent announcement (US)	(-2, +2) (-2, +2) (-2, +2) (-2, +2) (-2, +2) (-2, +2)	-1,78 % **** -0,56 % *** -2,72 % *** -0,24 % -3,58 % **** -0,65 % **
Elayan et al. (1998)	the US 1979–1991	646	Full sample < 2 % of employees > 2 % of employees First announcement Subsequent announcement	(-1, 0) (-1, 0) (-1, 0) (-1, 0) (-1, 0)	-0,64 % **** -0,53 % *** -0,97 % **** -1,27 % **** -0,42 % ***
Filbeck & Webb (2001)	the US 1990–1997	366	Full sample Smaller companies Larger layoffs	(-1, +1) (-1, 0) (-1, 0)	-1,24 % *** more negative reaction ***
Hillier et al. (2007)	UK 1990–2000	322	Full sample Reactive layoffs Proactive layoffs < 4,1 % of employees > 4,1 % of employees First announcement Subsequent announcement	(-1, +1) (-1, +1) (-1, +1) (-1, +1) (-1, +1) (-1, +1) (-1, +1)	-0,81 %** -1,46 % ** +0,20 % -0,44 % -1,17 % ** -1,16 % ** -0,37 %
Capelle-Blancard & Tatu (2012)	Europe 2002–2010	1605	Full sample Reactive layoffs Proactive layoffs	(-1, +1) (-1, +1) (-1, +1)	-0,17 % -0,88 % *** +0,78 % ***
Marshall et al. (2012)	UK, 2005–2006 2008	67 78	Full sample (upturn) Full sample (downturn)	(-1, +1) (-1, +1)	+0,51 % * -1,75 % ***
Kunert et al. (2017)	Renewable energy sector	65	Full sample Reactive layoffs	(0, +1) (0, +1)	-5,08 % *** -5,09 % ***

	2005–2014		Proactive layoffs	(0, +1)	-5,07 % ***

In the table, ****, ***, ** and * denote the statistical significance level:

**** significant at 0,1 % significance level,

*** significant at 1 % significance level,

** significant at 5 % significance level,

* significant at 10 % significance level.

5 Data and Methodology

This chapter presents the data and the methodology used in the study. First, a description of the data is provided. The first subchapter also presents how and where the data was collected. After that, the second subchapter presents the methodology used in the study and a description of how the study progresses in practice, i.e., the structure of the event study methodology is presented.

5.1 Data

The data of the study consists of layoff announcements published by companies and historical stock price data. The historical stock price data from Thomson Reuters Datastream is used to calculate the returns of the stocks. The companies under examination have been listed on the Nasdaq Helsinki during the research period 2010–2019. In more detail, the research period starts from the beginning of January 2010 and ends at the end of December 2019.

The final sample consists of a total of 384 layoff announcements published by 77 different companies. The layoff announcements have been collected from Kauppalehti, Central Organization of Finnish Trade Unions (SAK) and the companies' websites. In order to examine whether the stated reason for layoffs affects the stock market reaction, the sample is divided into two sub-samples: proactive and reactive layoff announcements. The sub-sample of proactive layoff announcements includes layoffs for which the stated reason is improving efficiency and the sub-sample of reactive layoffs includes layoffs for which the stated reason is adverse market conditions or declining demand. The same classification has been used by, among others, Palmon et al. (1997) and Capelle-Blancard and Tatu (2012) in their studies. The sub-sample of proactive layoff announcements contains 133 announcements, and the sub-sample of reactive layoff announcements contains 241 announcements. No clear reason was given for ten layoff announcements, so they are not classified in either sub-sample. The table below provides more detailed information on layoff announcements.

Table 2. Descriptive statistics of layoff announcements.

Classification	Total number	Size (mean in persons)	Relative size (mean, median)	Publishing companies
LAs	384	128	6,58 %, 2,88 %	77
Proactive LAs	133	-	-	-
Reactive LAs	241	-	-	-
Undefined LAs	10	-	-	-

The layoff announcements are also divided into two sub-samples based on the size of the layoffs, the size of the company publishing the layoff announcement, and whether the announcement is the first or subsequent announcement of the company. In order to examine whether the size of the layoffs has an effect on the stock market reaction, the percentage of employees to be laid off out of the total number of employees in the company is calculated. In this study, an estimate of the number of employees to be laid off provided by the company is used in calculating the percentage of employees to be laid off relative to the company's entire workforce. Once the relative size of the layoffs has been calculated for all layoff announcements, the announcements are divided into two sub-samples based on the median of the sample. Thus, the sub-samples are above the median of the full sample and below the median of the full sample. Hillier et al. (2007) have used the same classification when examining the effect of layoffs size on stock market reaction. Regarding the effect of company size on the stock market reaction, layoff announcements are divided into two sub-samples based on the market value of the company. The first sub-sample contains layoff announcements where the market value of the company publishing the announcement is above the median of the full sample, and the second contains announcements where the market value of the company is below the median.

Although it would be ideal to use the most recent data, the research period is limited to the end of the year 2019. In other words, the years 2020 and 2021 have been excluded from the research period, though the impact of the layoff announcements on the stock market reaction could have been examined for these years as well. The research period has been consciously limited due to the coronavirus pandemic that has been going on for the past two years. The reasons for excluding the coronavirus pandemic period are, among other things, the fact that different industries are suffering differently, and stock prices have risen for the past year and a half after the sharp decline of one month mainly through support measures. For example, the restaurant and tourism industry has suffered particularly hard from the coronavirus pandemic due to restrictions imposed by the government. Moreover, although companies have published several layoff announcements during the coronavirus pandemic, it is difficult to examine the stock market reaction to layoff announcements during that period, as it is almost impossible to control other events that could distort empirical findings. For example, news related to the coronavirus vaccinations has affected stock prices, and it would be impossible to control such events. Layoff announcements around which the company has published other important announcements such as the dividend announcements have been omitted from the final sample to minimize the impact of other announcements on empirical findings. By controlling other announcements, more reliable results of how the stock market reacts to layoff announcements are obtained.

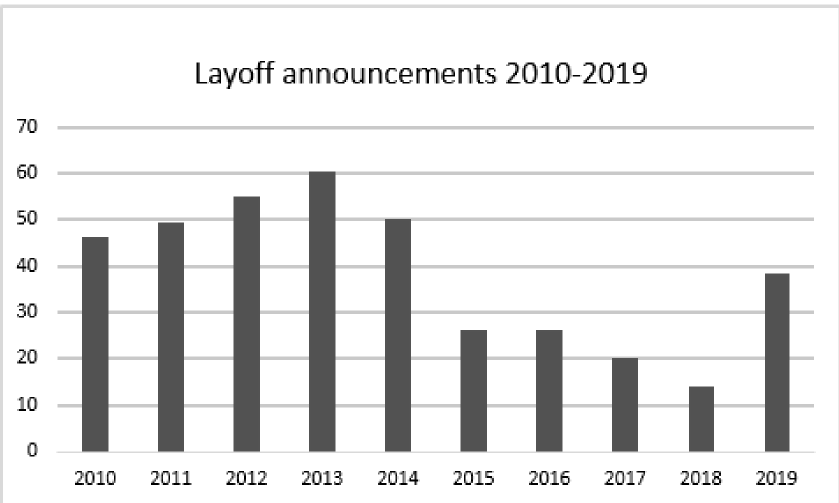

Figure 3. Annual distribution of 384 layoff announcements.

5.2 Methodology

In this study, the event study methodology is used, as in previous studies examining the impact of layoff announcements on stock prices. The event study methodology is commonly used in finance studies as it can be used to measure the impact of various events on a company's stock value. Besides the studies focusing on the relationship between layoff announcements and stock prices, the event study methodology has been applied, among other things, in studies examining the effect of earnings announcements and stock issues on the company's stock value. The event study methodology assumes that the market is efficient, as a result of which the stock market data for a relatively short period can be used. This is due to when the market is efficient, the impact of the event is immediately reflected in stock prices. (MacKinlay, 1997.)

Event studies focus on measuring abnormal returns around a defined event to determine whether the event has an impact on stock price performance. In other words, it is determined whether the development of stock prices around the event deviates from the normal development. The possible deviation is determined by comparing the expected returns with the actual returns. If the actual returns differ from the expected returns, abnormal returns are observed. In the case that abnormal returns are observed for several days after the defined event, it can be stated that the market is inefficient, as the information should be reflected in stock prices immediately according to the efficient market hypothesis. Thus, examining a defined event using the event study methodology provides an indication of the level of market efficiency. (MacKinlay, 1997.)

5.2.1 Structure of the event study

There are many different versions of event studies, but the structure of event studies is broadly similar. MacKinlay (1997) defines the structure of the event study as follows:

1.) Defining the event to be examined and the event window
2.) Defining the selection criteria for the companies to be examined

3.) Defining how to measure normal and abnormal returns
4.) Defining the estimation window
5.) Statistical testing for abnormal returns
6.) Presenting empirical results
7.) Interpretation of results and conclusions.

In the first stage of the event study, the events to be examined and the event window are specified. The event window is the study period around the event, which is specified in order to examine the stock price reaction around the event. (MacKinlay, 1997.) The events to be examined in this study are the stock exchange releases published by the companies on the commencement of co-determination. The event date is the day on which the stock exchange release is published. The event window of the study, in turn, is defined as an 11-day event window (-5, +5) that begins 5 days before the event date and ends 5 days after the event date. The 11-day event window allows to examine both the efficiency of the market after the event date and possible leakage of information before the event date. The same (-5, +5) event window has been used, for example, by Worrell et al. (1991).

In the second stage, the selection criteria for the companies to be examined are defined. In this study, the only criterion for the companies is that the companies must have been listed on the Nasdaq Helsinki in the period 2010–2019. Next, it is defined how to calculate normal and abnormal returns. Abnormal returns are obtained by subtracting normal returns from the actual returns of event window. Normal returns refer to returns that occur when nothing deviant happens in the market. In other words, when there is no event. Abnormal returns can be calculated using the following formula (MacKinlay, 1997):

$$AR_{it} = R_{it} - E(R_{it}) \tag{7}$$

Where: AR_{it}= the abnormal return of stock i at time t,

R_{it} = the actual return of stock i at time t,

$E(R_{it})$ = the normal expected return of stock i at time t.

In order to calculate abnormal returns, normal returns must be calculated first. There are several models for calculating normal returns, but in this study, normal returns are calculated using a market model, which connects the return of a stock and the market portfolio return. The market model has been used, for example, in the study of Kunert et al. (2017). Using the market model, the normal return of stock i is obtained as follows (MacKinlay, 1997):

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \quad E[\varepsilon_{it}] = 0, \quad Var[\varepsilon_{it}] = \sigma^2_{\varepsilon_{it}} \tag{8}$$

Where: R_{it}= the normal return of stock i at time t,

α_i = a parameter measuring the part of the return that is not affected by market movements,

β_i = a parameter measuring the market risk,

R_{mt} = the return of market portfolio at time t,

ε_{it} = the error term of stock return at time t.

In this study, OMX Helsinki total return index (OMXHGI) is used to calculate the market portfolio return. The parameters β_i and α_i are estimated by the following formulas (MacKinlay, 1997):

$$\beta_i = \frac{Cov(r_i, r_m)}{Var(r_m)} \tag{9}$$

Where: β_i = the beta of stock i,

$Cov(r_i, r_m)$ = the covariance between the return of stock i and the return of market portfolio,

$Var(r_m)$ = the variance of market portfolio return.

$$\alpha_i = \bar{R}_i - \beta_i \bar{R}_m \tag{10}$$

Where: $\bar{R}_i$ = the average return of stock i,

β_i = the beta of stock i,

$\bar{R}_m$ = the average return of market portfolio.

After the parameters of the market model have been estimated and normal returns have been calculated, abnormal returns can be calculated using the market model. The abnormal returns are calculated with the following formula (MacKinlay, 1997):

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \tag{11}$$

Where: AR_{it} = the abnormal return of stock i at time t,

R_{it} = the actual return of stock i at time t,

α_i = the alpha of stock i at time t,

β_i = the beta of stock i at time t,

R_{mt} = the return of market portfolio at time t.

Once the abnormal returns have been calculated for each stock for each day of the event window, the average abnormal return for each day of the event window is calculated. In this study, the average abnormal return is calculated for 11 days, as the event window (-5, +5) contains 11 days. The average abnormal return (AAR) is obtained with the following formula (MacKinlay, 1997):

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it} \tag{12}$$

Where: AAR_t = the average abnormal return of stocks at time t,

AR_{it} = the abnormal return of stock i at time t,

N = the number of observations.

After the abnormal returns have been calculated for the individual days on the event window, the abnormal returns are calculated for the entire event window. That is, the cumulative abnormal return is calculated by summing the abnormal returns of the individual days on the event window. The cumulative abnormal return (CAR) is calculated as follows (MacKinlay, 1997):

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \tag{13}$$

Where: $CAR_i(t_1, t_2)$ = the cumulative abnormal return of stock i over the period t_1- t_2

AR_{it} = the abnormal return of stock i at time t.

After calculating the cumulative abnormal returns for all individual stocks, the cumulative average abnormal returns (CAAR) for the entire sample are calculated. The cumulative average abnormal returns as well as average abnormal returns can also be calculated for subsamples. The cumulative average abnormal returns are obtained by the following formula (MacKinlay, 1997):

$$CAAR(t_1, t_2) = \frac{1}{N} \sum_{i=1}^{N} CAR_i(t_1, t_2) \tag{14}$$

Where: $CAAR(t_1, t_2)$ = the cumulative average abnormal return of stocks over the period t_1- t_2,

CAR_i = the cumulative abnormal return of stock i over the period t_1- t_2,

N = the number of observations.

In the fourth stage of the event study, before the actual calculation of the abnormal returns is done, the estimation window is defined. The estimation window is an estimation period, which is used to estimate normal returns. The length of the estimation window varies between studies, but generally the estimation window is about 200-250 trading days. (MacKinlay, 1997.) In this study, 250 trading days before the event window have been chosen as the estimation window. The same 250 trading days estimation window was used, among others, by Kunert et al. (2017) in their study. They pointed out that since 250 trading days equals about a year, using 250 trading days as an estimation window adjusts for possible seasonal non-stationarities in stock prices. The estimation window and event window used in this study are illustrated in the figure below.

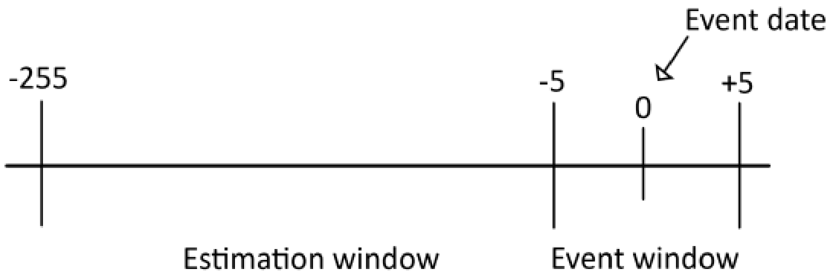

Figure 4. The estimation window and the event window used in the study.

The next step in the event study is to test the statistical significance of abnormal returns. The statistical testing is performed to ensure that abnormal returns are not due to sampling error, as the abnormal returns may be due to coincidence. The test of statistical significance of the average abnormal returns is performed with the following formula (Vaihekoski, 2004: 233):

$$\frac{AAR_t}{\sqrt{\sigma^2(AAR_t)}} \sim t(N) \tag{15}$$

$$\sigma^2(AAR_t) = \frac{1}{N^2}\sum_{i=1}^{N}\sigma_{it}^2 = \frac{1}{N^2}\sum_{i=1}^{N}\sigma^2(\varepsilon_i)$$

The statistical testing of cumulative average abnormal returns is, in turn, performed using the following formula (Vaihekoski, 2004: 233):

$$\frac{CAAR(t_1, t_2)}{\sqrt{\sigma^2\big(CAAR(t_1, t_2)\big)}} \sim N(0,1) \tag{16}$$

$$\begin{aligned} \sigma^2 CAAR(t_1, t_2) &= \frac{1}{N^2}\sum_{i=1}^{N} \sigma_i^2\,(t_1, t_2) \\ &= \frac{1}{N^2}\sum_{i=1}^{N} (t_2 - t_1 + 1)\sigma_t^2\,(\varepsilon_i) \end{aligned}$$

As the statistical significance of the results is examined, significance levels that indicate the degree of risk that the findings are due to coincidence must be defined. The significance level measures the statistical reliability of the findings by measuring the probability that the null hypothesis is erroneously rejected. Commonly used significance levels are 0,1 % (0,001), 1 % (0,01), and 5 % (0,05). (Heikkilä, 2014: 184.) However, among others, Kunert et al. (2017) used the significance levels of 1 %, 5 % and 10 %. Thus, the significance levels of 1 % (0,01), 5 % (0,05), and 10% (0,10) are also used in this study. In the final stages of the event study, the results are interpreted, and the conclusions drawn are presented.

5.3 Limitations and possible problems concerning event studies

In addition to omitting layoff announcements around which the company has published other important announcements, such as dividend announcements, from the final sample, layoff announcements have also been limited on other grounds. MacKinlay (1997) points out that the reliability of the results can be negatively affected by the low level of trading, that is, if the stock's trading volume is low, and the irregularity of trading. If the closing prices that do not occur at regular intervals are used in the study, it affects both stock variances and covariances. Because the variance and covariance of an individual stock are used to estimate the parameters of the market model, the estimated parameters may become distorted and thus affect the abnormal returns obtained.

However, the irregularity of trading should not be a problem regarding this study, contrary to the low trading volume of the stocks. In order to avoid problems related to low trading volume, layoff announcements of companies whose stocks trading volume has been at a low level from the estimation window to the event window have been omitted from the final sample. Moreover, if a company has more than one series of stocks listed on the Nasdaq Helsinki, the series of stocks with the highest trading volume has been selected for the study.

Layoff announcements of companies whose stock price data are not available for a sufficiently long period have been omitted from the dataset. If the company's stock price data were not available for the entire 250-day estimation window, the layoff announcement has been omitted from the final sample. This is because, if shorter-term stock price data were used, it would be possible that both the estimation of the market model parameters and the estimation of normal and abnormal returns could be affected by potential seasonal non-stationaries in stock prices, as Kunert et al. (2017) have noted.

MacKinlay (1997) also points out that defining the right date of the event is important. If defining the right event date is unsuccessful, the study results may become significantly distorted and thus may give an erroneous overall view of the event under the examination. For instance, if the study uses layoff announcements collected from news or newspapers, the information may have already been published the day before. Since in this case, a day after the right event date is used as an event date, the results could indicate that there are information leaks in the market that do not actually exist. In order to succeed in defining the right date of the event, the stock exchange releases of companies announcing the commencement of co-determination are used in this study. The limitations of the study are done to seek to avoid common problems associated with event studies and to improve the reliability of the empirical study results.

6 Empirical Results

In this chapter, empirical results of the study are presented. The chapter presents the results of both univariate and multivariate analysis. Regarding the univariate analysis, the findings for the full sample are presented first after which the findings for different sub-samples are presented. The figures are used to facilitate the illustration of the results.

6.1 Results of the full sample

The results of the full sample are shown in detail in table 3 and illustrated in figure 5. The results indicate that the stock market reaction to layoff announcements is generally negative. The stock prices decrease by an average of 0,80 % on the event day. The finding is statistically significant at the 1 % significance level.

Table 3. Average abnormal returns and cumulative average abnormal returns for the full sample. N=384. In the table, *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	-0,01 %	-0,113	0,910	-0,01 %	-0,113	0,910
-4	-0,02 %	-0,196	0,845	-0,04 %	-0,218	0,828
-3	-0,04 %	-0,309	0,757	-0,07 %	-0,357	0,721
-2	0,12 %	1,025	0,306	0,05 %	0,204	0,838
-1	0,06 %	0,558	0,577	0,11 %	0,432	0,666
0	**-0,80 %***	-6,977	0,000	**-0,69 %**	-2,454	0,015
1	-0,02 %	-0,212	0,832	**-0,71 %**	-2,352	0,019
2	0,04 %	0,367	0,714	**-0,67 %**	-2,071	0,039
3	0,07 %	0,627	0,531	**-0,60 %***	-1,743	0,082
4	0,04 %	0,336	0,737	-0,56 %	-1,548	0,122
5	-0,16 %	-1,391	0,165	**-0,72 %***	-1,895	0,059

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	0,11 %	**-0,76 %***	**-0,83 %***	-0,03 %
t-value	0,432	-3,828	-5,083	-0,122
p-value	0,666	0,000	0,000	0,903

For the full sample, the cumulative average abnormal returns are statistically significantly negative from the event day, except for the fourth day after the event, when the CAARs are negative but statistically insignificant. Moreover, for the two-day (0, +1) and the three-day (-1, +1) event windows, statistically significant negative CAARs at the 1 % significance level are observed. On the two-day event window, the stock prices decrease by an average of 0,83 %, while on the three-day event window 0,76 %. The results are in line with the previous studies and support the first hypothesis that the layoff announcements cause a negative stock market reaction. The results of the full sample also suggest that the market is efficient, as statistically significant AARs are not observed before or after the event date.

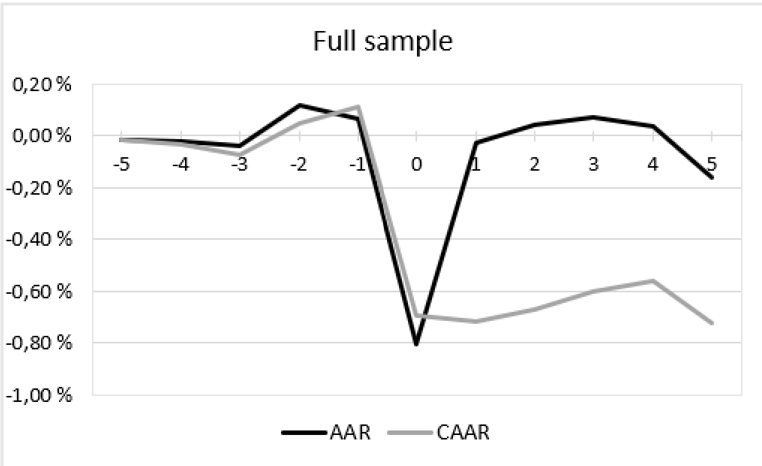

Figure 5. AARs and CAARs for full sample.

6.2 Reason of the layoffs

As mentioned earlier, the layoff announcements are divided into two sub-samples based on the reason stated for the layoffs. The results of the reactive layoff announcements are presented in table 4 and figure 6. As can be seen from table 4, the stock market reacts particularly negatively to layoff announcements for which the given reason is either unfavorable market conditions or declining demand. For reactive layoff announcements, the AAR on the event date is -1,37 %. The finding is statistically highly significant at the 1 % significance level. On the second day after the event date, in turn, the stock prices increase by 0,25 % on average. This may be correction after a sharp decline.

Table 4. Average abnormal returns and cumulative average abnormal returns for the reactive layoff announcements. N=241. In the table, *, ** and *** denote the statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	-0,13 %	-0,844	0,400	-0,13 %	-0,844	0,399
-4	0,06 %	0,420	0,675	-0,06 %	-0,300	0,764
-3	-0,10 %	-0,678	0,498	-0,16 %	-0,636	0,525
-2	-0,03 %	-0,211	0,833	-0,19 %	-0,657	0,512
-1	0,11 %	0,727	0,468	-0,09 %	-0,262	0,794
0	**-1,37 %*** **	-9,225	0,000	**-1,46 %*** **	-4,006	0,000
1	-0,09 %	-0,623	0,534	**-1,55 %*** **	-3,944	0,000
2	**0,25 %***	1,673	0,096	**-1,30 %*** **	-3,098	0,002
3	0,03 %	0,191	0,849	**-1,27 %*** **	-2,857	0,004
4	-0,02 %	-0,161	0,872	**-1,30 %*** **	-2,761	0,006
5	-0,08 %	-0,535	0,593	**-1,37 %*** **	-2,794	0,005

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	-0,09 %	**-1,35 %*** **	**-1,46 %*** **	0,08 %
t-value	-0,262	-5,266	-6,963	0,244
p-value	0,794	0,000	0,000	0,807

CAARs are statistically significantly negative at the 1 % significance level on the event date and the following five days. A strong negative reaction is also indicated by the results of CAARs for the two-day (0, +1) and the three-day (-1, +1) event windows. The results show that stock prices decrease by an average of 1,46 % on the two-day event window and 1,35 % on the three-day event window. CAARs are statistically significant at the 1 % significance level. It can be seen from figure 6 that there is no major movement in the CAARs after the event date but the CAARs remain at a relatively constant level until the end of the event window.

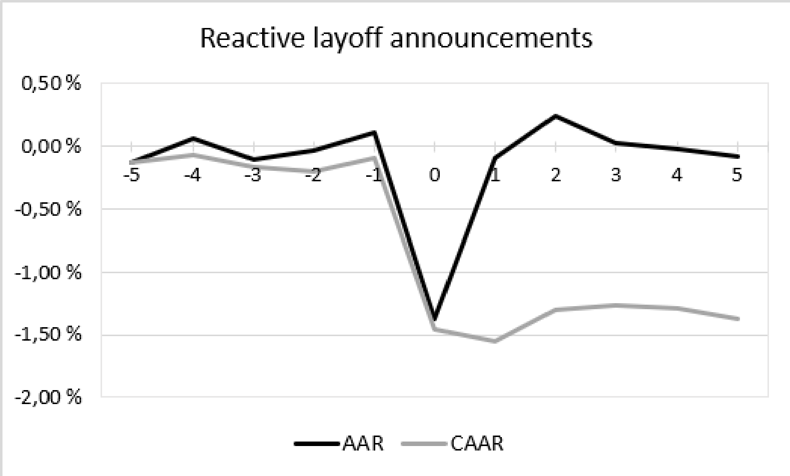

Figure 6. AARs and CAARs for reactive layoff announcements.

For proactive layoff announcements, the stock market reaction is positive on the event date, as can be seen from figure 7 and table 5. However, an average increase of 0,28 % in stock prices on the event date is statistically insignificant. For other days of the event window, the average abnormal returns range between negative and positive, and the only statistically significant AAR is observed on the last day of the event window, when the AAR is -0,38 %. The finding is significant at the 5 % significance level, but it is possible that the decline in stock prices is affected by an event other than the layoff announcement, as there are five days from the date of the event.

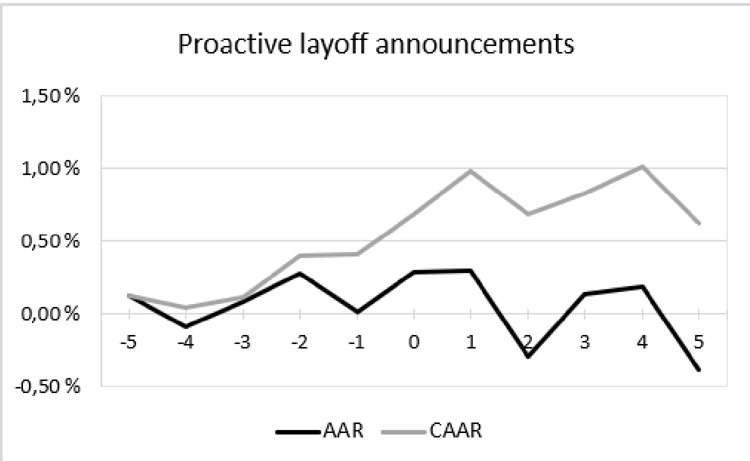

Figure 7. AARs and CAARs for proactive layoff announcements.

The CAARs of the proactive layoff announcements are positive for the entire event window, indicating a positive stock market reaction. The CAARs are statistically significant on the day after the event date and the fourth day after the event date, although at the 10 % significance level. On the event windows (0, +1) and (-1, +1) statistically significant CAARs are also observed. CAARs are 0,58 % on the two-day event window and 0,59 % on the three-day event window.

Table 5. Average abnormal returns and cumulative average abnormal returns for the proactive layoff announcements. N=133. In the table, *, ** and *** denote the statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	0,13 %	0,673	0,502	0,13 %	0,673	0,502
-4	-0,09 %	-0,464	0,643	0,04 %	0,148	0,883
-3	0,08 %	0,412	0,681	0,12 %	0,359	0,720
-2	0,28 %	1,471	0,144	0,39 %	1,046	0,297
-1	0,01 %	0,057	0,955	0,40 %	0,961	0,338
0	0,28 %	1,499	0,136	0,69 %	1,490	0,139
1	0,29 %	1,564	0,120	**0,98 %***	1,970	0,051
2	-0,29 %	-1,554	0,123	0,69 %	1,294	0,198
3	0,14 %	0,728	0,468	0,83 %	1,462	0,146
4	0,18 %	0,979	0,329	**1,01 %***	1,697	0,092
5	**-0,38 %****	-2,036	0,044	0,63 %	1,004	0,317
$[t_1, t_2]$	**[-5, -1]**	**[-1, +1]**	**[0, +1]**	**[+1, +5]**		
CAAR	0,40 %	**0,59 %***	**0,58 %****	-0,06 %		
t-value	0,961	1,802	2,166	-0,143		
p-value	0,338	0,074	0,032	0,887		

Table 6 and figure 8 show the differences in AARs and CAARs between reactive and proactive sub-samples (reactive-proactive). The results show that the stock market reacts statistically significantly more negatively to reactive layoff announcements than to proactive layoff announcements. On the date of the event, the reaction is 1,65 % more negative for reactive layoff announcements. However, on the second day after the event date, the AAR of reactive layoff announcements is 0,54 % more positive than the AAR of proactive layoff announcements. CAARs also indicate a more negative reaction of reactive layoff announcements, as CAARs are statistically significantly negative after the event. On the event window (0, +1), the stock market reacts an average of 2,04 % more negatively to reactive announcements than to proactive announcements.

Thus, it can be stated that the results support the second hypothesis, i.e., the stock market reacts more negatively to reactive layoff announcements than proactive ones.

Table 6. Differences in average abnormal returns and cumulative average abnormal returns between reactive and proactive layoff announcements. In the table, *, ** and *** denote the statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	-0,25 %	-1,051	0,294	-0,25 %	-1,051	0,294
-4	0,15 %	0,624	0,533	-0,10 %	-0,302	0,763
-3	-0,18 %	-0,743	0,458	-0,28 %	-0,676	0,499
-2	-0,31 %	-1,286	0,199	-0,59 %	-1,228	0,220
-1	0,10 %	0,405	0,686	-0,49 %	-0,918	0,359
0	**-1,65 %*** **	-6,888	0,000	**-2,14 %*** **	-3,650	0,000
1	-0,39 %	-1,614	0,107	**-2,53 %*** **	-3,989	0,000
2	**0,54 %** **	2,256	0,025	**-1,99 %*** **	-2,934	0,004
3	-0,11 %	-0,453	0,651	**-2,10 %*** **	-2,917	0,004
4	-0,21 %	-0,869	0,385	**-2,30 %*** **	-3,042	0,003
5	0,30 %	1,268	0,206	**-2,00 %** **	-2,518	0,012

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	-0,49 %	**-1,94 %*** **	**-2,04 %*** **	0,14 %
t-value	-0,918	-4,675	-6,012	0,263
p-value	0,359	0,000	0,000	0,793

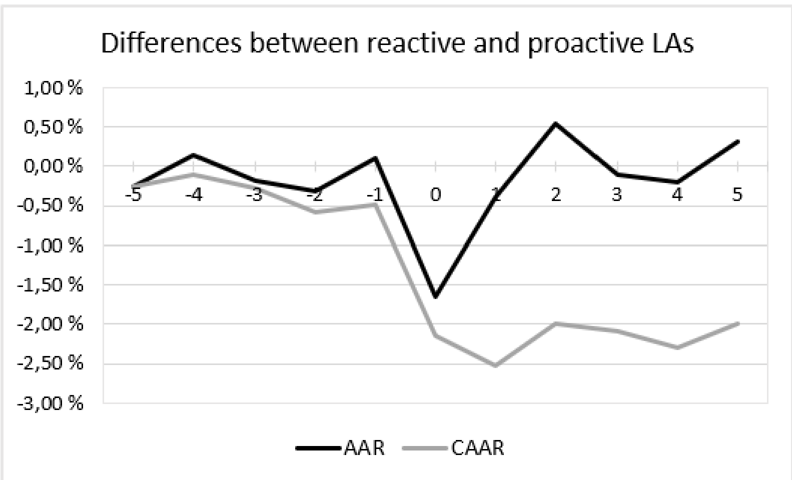

Figure 8. Differences in AARs and CAARs between reactive and proactive layoff announcements.

6.3 Size of the layoffs

In order to examine whether the stock market reaction is affected by the size of the layoff announcements, the full sample is divided into two sub-samples according to the layoff ratio median of the full sample. The results of the layoff announcements below the median are presented in table 7 and illustrated in figure 9. The results show that the reaction is statistically significantly negative on the date of the event. The stock prices decline by an average of 0,51 % on the day of the layoff announcement. On the third day after the date of the event, a statistically significant positive AAR of 0,26 % is observed. However, this finding is only statistically significant at the 10 % significance level.

Table 7. Average abnormal returns and cumulative average abnormal returns for layoff announcements with a layoff ratio below the median (2,88 %) of the full sample. N=192. In the table, *, ** and *** denote the statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	0,06 %	0,371	0,711	0,06 %	0,371	0,711
-4	-0,08 %	-0,535	0,593	-0,02 %	-0,116	0,908
-3	0,15 %	1,005	0,316	0,13 %	0,486	0,628
-2	0,15 %	0,995	0,321	0,28 %	0,918	0,360
-1	-0,07 %	-0,464	0,643	0,21 %	0,614	0,540
0	**-0,51 %*** **	-3,350	0,001	-0,30 %	-0,807	0,421
1	0,03 %	0,170	0,865	-0,27 %	-0,683	0,495
2	0,08 %	0,553	0,581	-0,19 %	-0,443	0,658
3	**0,26 %***	1,686	0,093	0,07 %	0,144	0,886
4	0,07 %	0,439	0,661	0,13 %	0,275	0,784
5	-0,06 %	-0,375	0,708	0,08 %	0,149	0,882

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	0,21 %	**-0,55 %****	**-0,48 %****	0,37 %
t-value	0,614	-2,103	-2,248	1,106
p-value	0,540	0,037	0,026	0,270

On two- and three-day event windows, the CAARs are negative, indicating a negative stock market reaction around the date of the event. The CAAR is -0,48 % on the event window (0, +1), while the CAAR is -0,55 % on the event window (-1, +1). The CAARs are statistically significant at the 5 % significance level. For the other days, the CAARs are statistically insignificant.

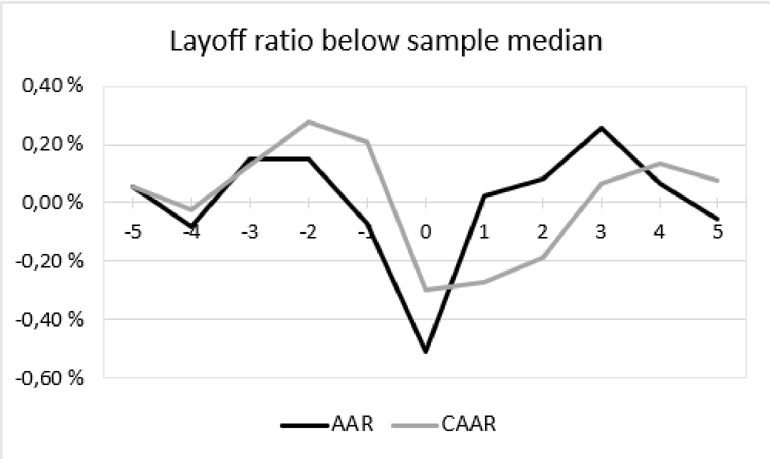

Figure 9. AARs and CAARs for layoff announcements with a layoff ratio below the median of the full sample.

For layoff announcements above the median of the full sample, a negative reaction is also observed on the event date. The stock prices decline by an average of 1,10 % on the day of the layoff announcement. The finding is statistically significant at the 1 % significance level. For other days in the event window, statistically significant AARs are not observed. Regarding the CAARs of the sub-sample, it is observed that the CAARs are statistically significantly negative from the date of the event until the end of the event window. During the entire event window (-5, +5), the stock prices decline 1,42 % on average. The CAARs of the two- and three-day event windows around the event date also indicate a negative market reaction. The statistically significant CAARs are -1,07 % and -0,87 % on the event windows (0, +1) and (-1, +1). The results are presented in more detail in table 8 and figure 10 on the next page.

Table 8. Average abnormal returns and cumulative average abnormal returns for layoff announcements with a layoff ratio above the median (2,88 %) of the full sample. N=192. In the table, *, ** and *** denote the statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	-0,08 %	-0,476	0,635	-0,08 %	-0,476	0,635
-4	0,04 %	0,209	0,835	-0,05 %	-0,188	0,851
-3	-0,22 %	-1,293	0,198	-0,27 %	-0,901	0,369
-2	0,08 %	0,491	0,624	-0,18 %	-0,534	0,594
-1	0,20 %	1,149	0,252	0,01 %	0,036	0,971
0	**-1,10 %*** **	-6,343	0,000	**-1,08 %** **	-2,557	0,011
1	0,02 %	0,133	0,894	**-1,06 %** **	-2,317	0,022
2	0,00 %	0,003	0,998	**-1,06 %** **	-2,166	0,032
3	-0,11 %	-0,646	0,519	**-1,17 %** **	-2,258	0,025
4	0,01 %	0,062	0,951	**-1,16 %** **	-2,122	0,035
5	-0,26 %	-1,522	0,130	**-1,42 %** **	-2,482	0,014

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	0,01 %	**-0,87 %*** **	**-1,07 %*** **	-0,34 %
t-value	0,036	-2,922	-4,391	-0,881
p-value	0,971	0,004	0,000	0,379

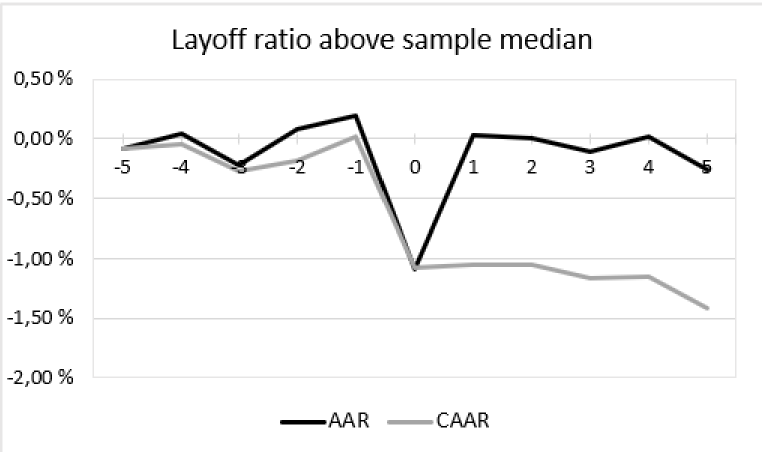

Figure 10. AARs and CAARs for layoff announcements with a layoff ratio above the median of the full sample.

When comparing the results of the two sub-samples, it is observed that the stock market reaction is more negative for layoff announcements with a layoff ratio above the median of the full sample. The results presented in table 9 show that on the day of the layoff announcement, the difference in AARs is -0,59 %. The finding indicates that layoff announcements with a layoff ratio above the median cause an average of 0,59 % more negative stock market reaction than layoff announcements with a layoff ratio below the median and it is statistically significant at the 5 % significance level. CAARs, in turn, indicate statistically significant differences from the third day after the event date to the last day of the event window. A statistically significant difference is also observed in the CAARs of the event window (0, +1).

Table 9. Differences in average abnormal returns and cumulative average abnormal returns between layoff announcements above the layoff ratio median and layoff announcements below the layoff ratio median. In the table, *, ** and *** denote the statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	-0,14 %	-0,602	0,548	-0,14 %	-0,602	0,548
-4	0,12 %	0,510	0,610	-0,02 %	-0,065	0,948
-3	-0,38 %	-1,635	0,103	-0,40 %	-0,997	0,319
-2	-0,07 %	-0,287	0,774	-0,46 %	-1,007	0,315
-1	0,27 %	1,169	0,243	-0,19 %	-0,378	0,706
0	**-0,59 %****	-2,559	0,011	-0,78 %	-1,390	0,165
1	0,00 %	0,013	0,990	-0,78 %	-1,291	0,197
2	-0,08 %	-0,362	0,718	-0,87 %	-1,336	0,182
3	-0,37 %	-1,597	0,111	**-1,23 %***	-1,792	0,074
4	-0,06 %	-0,243	0,808	**-1,29 %***	-1,777	0,076
5	-0,21 %	-0,896	0,371	**-1,50 %****	-1,964	0,050

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	-0,19 %	-0,32 %	**-0,59 %***	-0,71 %
t-value	-0,378	-0,809	-1,818	-1,392
p-value	0,706	0,419	0,070	0,165

Based on the study findings, it can be stated that larger layoffs cause a more negative reaction than smaller layoffs. Thus, the results support the third hypothesis of the study and are in line with the findings of Elayan et al. (1998) and Hillier et al. (2007), among others. The differences between the two sub-samples are illustrated on the next page in figure 9.

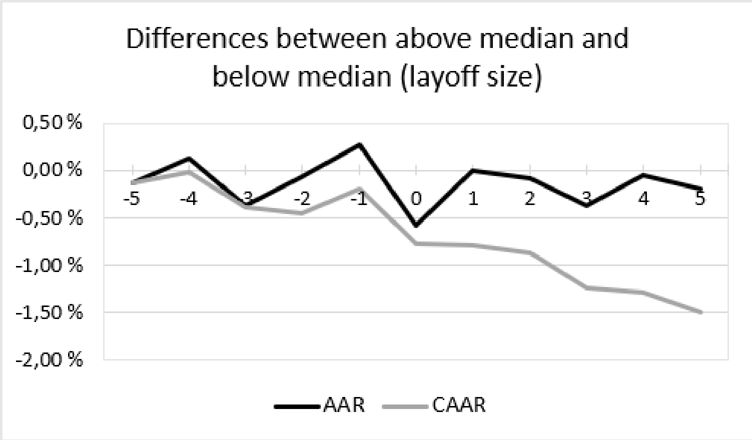

Figure 11. Differences in AARs and CAARs between layoff announcements above the layoff ratio median and layoff announcements below the layoff ratio median.

6.4 First and subsequent layoff announcements of the companies

In order to examine whether there are differences in the stock market reaction between the company's first and subsequent layoff announcements, the layoff announcements are divided into two sub-samples. Figure 12 and table 10 show the results for the first sub-sample, that is, for the first layoff announcements of companies. As can be seen, for the first layoff announcements, the reaction is statistically significantly negative on the event date. On average, the stock prices decline by 0,85 % on the day of the layoff announcement. Statistically significant AARs are not observed on other days in the event window.

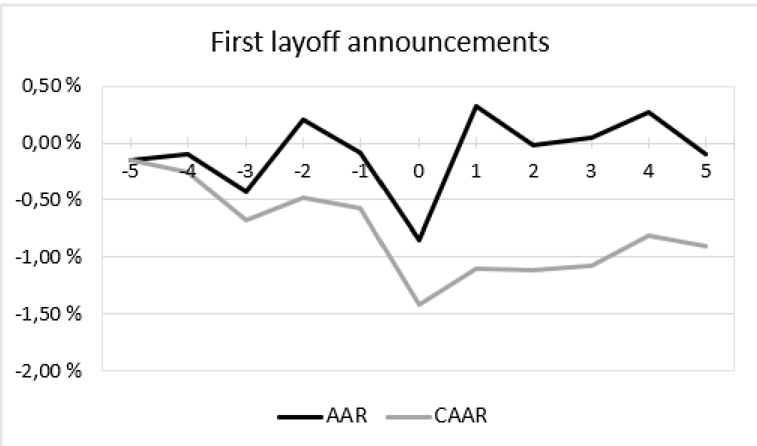

Figure 12. AARs and CAARs for first layoff announcements of companies.

The CAAR is also statistically significantly negative on the event date. From the five days before the announcement to the day of the announcement, stock prices decline by an average of 1,42 %. On shorter event windows (-5, -1), (-1, +1), and (0, +1), negative CAARs are observed, however, statistically insignificant. The CAAR of the event window (+1, +5) is positive, although also statistically insignificant.

Table 10. Average abnormal returns and cumulative average abnormal returns for first layoff announcements of companies. N=77. In the table, *, ** and *** denote the statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	-0,15 %	-0,589	0,558	-0,15 %	-0,589	0,558
-4	-0,10 %	-0,368	0,714	-0,25 %	-0,677	0,500
-3	-0,43 %	-1,647	0,104	-0,68 %	-1,503	0,137
-2	0,20 %	0,780	0,438	-0,48 %	-0,912	0,365
-1	-0,09 %	-0,346	0,730	-0,57 %	-0,971	0,335
0	**-0,85 %*** **	-3,232	0,002	**-1,42 %** **	-2,206	0,030
1	0,32 %	1,221	0,226	-1,10 %	-1,581	0,118
2	-0,02 %	-0,072	0,943	-1,12 %	-1,504	0,137
3	0,04 %	0,163	0,871	-1,07 %	-1,364	0,177
4	0,27 %	1,024	0,309	-0,80 %	-0,970	0,335
5	-0,09 %	-0,357	0,722	-0,90 %	-1,032	0,305

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	-0,57 %	-0,62 %	-0,53 %	0,52 %
t-value	-0,971	-1,361	-1,422	0,885
p-value	0,335	0,178	0,159	0,379

The results of the second sub-sample, that is, the subsequent layoff announcements of companies, are presented in table 11 and figure 13. Also, for the subsequent layoff announcements, the only statistically significant AAR is observed on the event date. The finding is significant at the 1 % significance level. In the case of subsequent layoff announcements, the stock prices decline by an average of 0,79 % on the day of the announcement. Statistically significant AARs are not observed on the other days in the event window, as were not observed also for the first layoff announcements.

Table 11. Average abnormal returns and cumulative average abnormal returns for subsequent layoff announcements of companies. N=307. In the table, *, ** and *** denote the statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	0,02 %	0,176	0,860	0,02 %	0,176	0,860
-4	0,00 %	-0,030	0,976	0,02 %	0,103	0,918
-3	0,06 %	0,500	0,617	0,08 %	0,373	0,709
-2	0,10 %	0,752	0,453	0,18 %	0,699	0,485
-1	0,10 %	0,806	0,421	0,28 %	0,985	0,325
0	**-0,79 %*** **	-6,183	0,000	-0,51 %	-1,625	0,105
1	-0,05 %	-0,390	0,697	**-0,56 %***	-1,652	0,099
2	0,06 %	0,450	0,653	-0,50 %	-1,386	0,167
3	0,08 %	0,621	0,535	-0,42 %	-1,100	0,272
4	-0,02 %	-0,150	0,881	-0,44 %	-1,091	0,276
5	-0,18 %	-1,381	0,168	-0,62 %	-1,456	0,146

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	0,28 %	**-0,74 %*** **	**-0,84 %*** **	-0,11 %
t-value	0,985	-3,330	-4,648	-0,380
p-value	0,325	0,001	0,000	0,704

On the day after the event, a statistically significant CAAR of -0,56 % is observed, albeit only at the significance level of 10 %. Thus, the stock prices decline by an average of 0,56 % from five days before the event to the day after the event. For the two-day (0, +1) and three-day (-1, +1) event windows, CAARs are -0,84 % and -0,74 %, respectively. Both CAARs are statistically significant at the 1 % significance level.

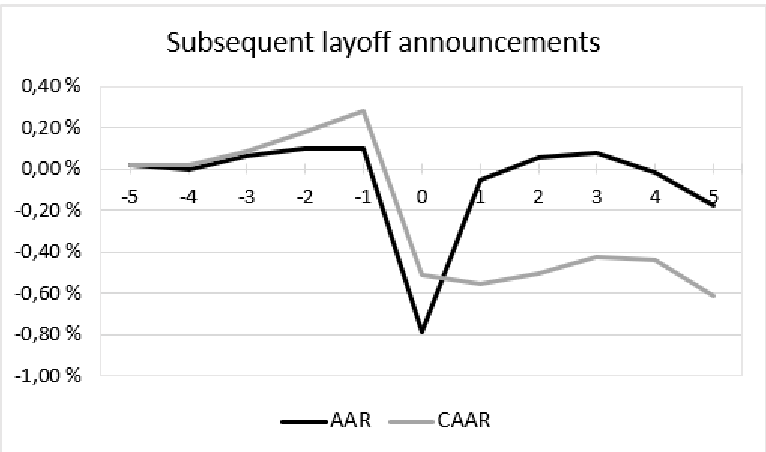

Figure 13. AARs and CAARs for subsequent layoff announcements of companies.

In table 12 and figure 14, in turn, the results of the differences between the first and subsequent layoff announcements. As can be seen from the results, a statistically significant difference in AARs is only observed three days before the layoff announcement with the difference of -0,50 %. This indicates that the AAR of the first layoff announcements is 0,50 % more negative than the AAR of the subsequent layoff announcements. As the difference is observed before the day of the layoff announcement, it does not indicate that the stock market reacts more negatively to first announcements than to subsequent announcements. Also, the finding is statistically significant only at the 10 % significance level. For the CAARs of the entire event window, the results show that the CAARs of the first layoff announcements are more negative than those of the subsequent layoff announcements, however, the differences are not statistically significant.

Table 12. Differences in average abnormal returns and cumulative average abnormal returns between first and subsequent layoff announcements. In the table, *, ** and *** denote the statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	-0,18 %	-0,606	0,545	-0,18 %	-0,606	0,545
-4	-0,09 %	-0,318	0,751	-0,27 %	-0,653	0,514
-3	**-0,50 %***	-1,700	0,090	-0,77 %	-1,515	0,131
-2	0,11 %	0,372	0,710	-0,66 %	-1,126	0,261
-1	-0,19 %	-0,664	0,507	-0,85 %	-1,304	0,193
0	-0,06 %	-0,198	0,843	-0,91 %	-1,271	0,205
1	0,37 %	1,268	0,206	-0,54 %	-0,697	0,486
2	-0,08 %	-0,262	0,793	-0,61 %	-0,745	0,457
3	-0,04 %	-0,126	0,900	-0,65 %	-0,744	0,457
4	0,29 %	0,986	0,325	-0,36 %	-0,394	0,694
5	0,08 %	0,284	0,777	-0,28 %	-0,290	0,772

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	-0,85 %	0,12 %	0,31 %	0,63 %
t-value	-1,304	0,235	0,757	0,962
p-value	0,193	0,814	0,450	0,337

On the other hand, while looking at shorter event windows around the event date, it is observed that the reaction caused by the first layoff announcements is more positive than that of the subsequent layoff announcements, although on the event date the reaction is slightly more negative for the first layoff announcements. Overall, the results indicate that there are no statistically significant differences in the stock market reaction between the two sub-samples. Thus, it can be concluded that the results do not support the fourth hypothesis, that is, the first layoff announcements do not cause a more negative reaction than the subsequent layoff announcements. The results contradict the research findings of Lee (1997), Elayan et al. (1998), and Hillier et al. (2007).

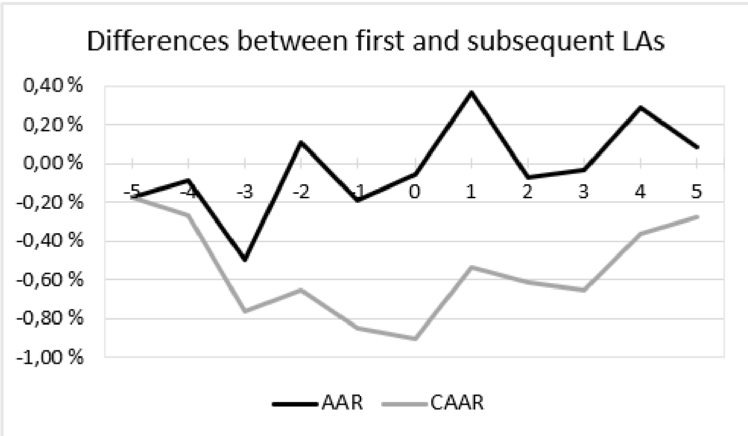

Figure 14. Differences in AARs and CAARs between first and subsequent layoff announcements.

6.5 Size of the company

The full sample is also divided into two sub-samples based on the market value of the company publishing the layoff announcement. More specifically, the division is based on the median of the full sample, which is 621,03 million. The division makes it possible to examine whether the layoff announcements of smaller companies cause a more negative stock market reaction, as expected due to information asymmetry.

Table 13 and figure 15 show the results for the sub-sample of market value below the median. The results indicate that the stock market reaction is negative with the AAR of -1,17 % on the event date. The finding is statistically significant at the 1 % significance level. Regarding the AARs, the results also show that the AAR is statistically significant on the last day of the event window with the AAR of -0,41 %. For the other days, the AARs are mainly negative but statistically insignificant.

Table 13. Average abnormal returns and cumulative average abnormal returns for layoff announcements with a publishing company's market value below the median (621,03M) of the full sample. N=192. In the table, *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	0,06 %	0,361	0,719	0,06 %	0,361	0,719
-4	-0,11 %	-0,703	0,483	-0,06 %	-0,242	0,809
-3	-0,11 %	-0,675	0,500	-0,17 %	-0,587	0,558
-2	0,14 %	0,874	0,383	-0,02 %	-0,071	0,943
-1	0,10 %	0,625	0,533	0,08 %	0,216	0,829
0	**-1,17 %*** **	-7,169	0,000	**-1,09 %*** **	-2,730	0,007
1	-0,07 %	-0,430	0,668	**-1,16 %*** **	-2,690	0,008
2	-0,09 %	-0,562	0,575	**-1,25 %*** **	-2,715	0,007
3	-0,10 %	-0,599	0,550	**-1,35 %*** **	-2,759	0,006
4	-0,05 %	-0,288	0,774	**-1,40 %*** **	-2,709	0,007
5	**-0,41 %** **	-2,537	0,012	**-1,81 %*** **	-3,347	0,001

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	0,08 %	**-1,14 %*** **	**-1,24 %*** **	**-0,72 %** **
t-value	0,216	-4,027	-5,373	-1,975
p-value	0,829	0,000	0,000	0,049

The CAARs are statistically significantly negative at the 1 % significance level from the date of the event until the last day of the event window. During the entire event window (-5, +5), the stock prices decline 1,81 % on average, while on the shorter event windows (0, +1) and (-1, +1), the stock prices decline by an average of 1,24 % and 1,14 %, respectively. Also, a statistically significant negative CAAR of -0,72 % is observed on the event window (+1, +5), which is a sign of the market being inefficient.

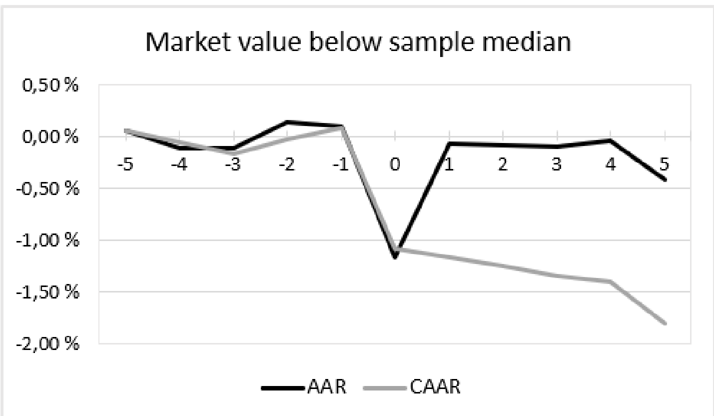

Figure 15. AARs and CAARs for layoff announcements with a company's market value below the median of the full sample.

Also, for the second sub-sample, that is, for layoff announcements with a market value above the median, the results show a negative reaction on the event date. The AAR of -0,43 % on the day of the announcement is statistically significant at the 1 % significance level. Statistically significant AARs are not observed on the other days of the event window, as can be seen from the table 14.

Table 14. Average abnormal returns and cumulative average abnormal returns for layoff announcements with a publishing company's market value above the median (621,03M) of the full sample. N=192. In the table, *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	-0,08 %	-0,524	0,601	-0,08 %	-0,524	0,601
-4	0,07 %	0,430	0,668	-0,02 %	-0,067	0,947
-3	0,04 %	0,241	0,810	0,02 %	0,085	0,932
-2	0,09 %	0,575	0,566	0,12 %	0,361	0,719
-1	0,03 %	0,163	0,871	0,14 %	0,396	0,693
0	**-0,43 %*** **	-2,684	0,008	-0,29 %	-0,735	0,463
1	0,12 %	0,734	0,464	-0,17 %	-0,403	0,687
2	0,18 %	1,086	0,279	0,00 %	0,007	0,994
3	0,24 %	1,491	0,138	0,24 %	0,504	0,615
4	0,12 %	0,766	0,445	0,37 %	0,720	0,472
5	0,09 %	0,579	0,563	0,46 %	0,861	0,390

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	0,14 %	-0,29 %	-0,32 %	**0,75 %****
t-value	0,396	-1,032	-1,379	2,082
p-value	0,693	0,303	0,170	0,039

Concerning the CAARs of the entire event window, the results show that the CAARs range from negative to positive, ending to a positive value on the last day of the event window. However, the only statistically significant CAAR is observed on the event window (+1, +5). The stock prices rise by an average of 0,75 % on that event window. The results of the sub-sample are graphically illustrated in figure 16 on the next page.

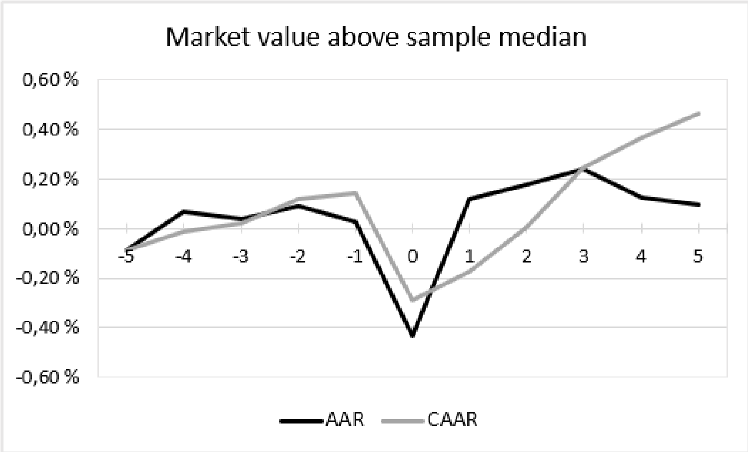

Figure 16. AARs and CAARs for layoff announcements with a company's market value above the median of the full sample.

The results of the differences between the two sub-samples, presented in figure 17 and table 15, confirm a more negative stock market reaction for layoff announcements of smaller companies than for layoff announcements of larger companies. As can be seen from table 15, on the event date, the stock market reacts, on average, 0,73 % more negatively to layoff announcements on which the publishing company's market value is below the median. The difference is statistically significant at the 1 % significance level. On the four days following the event date, the differences in AARs are negative but statistically significant. On the last day of the event window, a statistically significant difference of -0,51 % in AARs is observed.

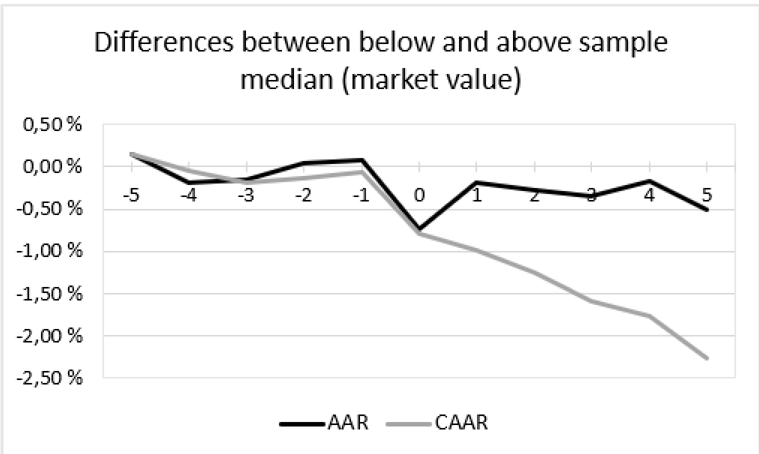

Figure 17. Differences in AARs and CAARs between layoff announcements below the market value median and layoff announcements above the market value median.

Statistically significant differences are also observed in CAARs. The results show that on the entire event window, the stock market reaction is, on average, 2,27 % more negative for layoff announcements on which the publishing company's market value is below the median. Also, on the shorter event windows (-1, +1), (0, +1), and (+1, +5), statistically significantly more negative CAARs are observed for layoff announcements of smaller companies. The difference is -0,92 % on the two-day event window, -0,85 % on the three-day event window, and -1,47 % on the five-day event window.

Table 15. Differences in average abnormal returns and cumulative average abnormal returns between layoff announcements below the market value median and layoff announcements above the market value median. In the table, *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % significance level.

t	AAR	t-value	p-value	CAAR	t-value	p-value
-5	0,14 %	0,625	0,532	0,14 %	0,625	0,532
-4	-0,18 %	-0,801	0,424	-0,04 %	-0,125	0,901
-3	-0,15 %	-0,648	0,517	-0,19 %	-0,476	0,634
-2	0,05 %	0,214	0,831	-0,14 %	-0,305	0,761
-1	0,08 %	0,328	0,743	-0,06 %	-0,126	0,900
0	**-0,73 %*** **	-3,194	0,002	-0,80 %	-1,419	0,157
1	-0,19 %	-0,822	0,412	-0,99 %	-1,624	0,105
2	-0,27 %	-1,164	0,245	**-1,25 %***	-1,931	0,054
3	-0,34 %	-1,476	0,141	**-1,59 %****	-2,313	0,021
4	-0,17 %	-0,744	0,457	**-1,76 %****	-2,429	0,016
5	**-0,51 %****	-2,208	0,028	**-2,27 %*****	-2,982	0,003

$[t_1, t_2]$	[-5, -1]	[-1, +1]	[0, +1]	[+1, +5]
CAAR	-0,06 %	**-0,85 %****	**-0,92 %*****	**-1,47 %*****
t-value	-0,126	-2,129	-2,840	-2,868
p-value	0,900	0,034	0,005	0,004

Overall, the results show that the stock market reacts more negatively to the layoff announcements of smaller companies than to layoff announcements of larger companies. Thus, the findings support the fifth hypothesis. The more negative reaction may be due to information asymmetry, as suggested by Filbeck and Webb (2001). The findings are similar to the findings of Filbeck and Webb (2001).

6.6 Results of the OLS regression

To confirm the results of the previously presented univariate analysis, an Ordinary Least Square (OLS) regression is formed. The regression model to be formed is similar to the model formed by Lee (1997). Common independent variables include a dummy variable for reactive layoff announcements, a dummy variable for first layoff announcements, and a variable for the layoff size. Moreover, in both models, the dependent variable is cumulative abnormal returns. However, the event window, for which the cumulative abnormal returns are calculated, differs from the event window (-2, +2) used by Lee (1997), as for some sub-samples statistically significant abnormal returns are observed later than two days after the event date. Thus, the cumulative abnormal returns of the event window (-1, +5) are chosen as the dependent variable of the regression model. The equation of the regression model is presented below.

$$CAR(-1,+5) = \alpha_0 + \beta_1 Reactive(D) + \beta_2 LayRt + \beta_3 First(D) + \beta_4 \ln(MV) \quad (17)$$

In the regression model, Reactive(D) is a dummy variable that takes value of one if the layoff announcement is reactive and value of zero if the layoff announcement is proactive. LayRt is the layoff ratio, that is, LayRt is a variable for the layoff size. First(D) is a dummy variable that takes value of one if the layoff announcement is the company's first layoff announcement and value of zero if the layoff announcement is the company's subsequent layoff announcement. Ln(MV) is the natural logarithm of the company's market capitalization, that is, ln(MV) is a variable for the company size.

The results of the regression are presented in table 16 on the next page. The results show that the coefficient for the reactive dummy is negative and statistically significant at the 5 % significance level. This indicates that CARs on the event window (-1, +5) are more negative for reactive layoff announcements than for proactive layoff announcements. Thus, the finding supports the results of the univariate analysis, and the second hypothesis that reactive layoff announcements cause a more negative stock market reaction is accepted. Regarding the size of the layoffs, the results contradict the results of the univariate analysis. Since the negative coefficient for the layoff ratio is statistically insignificant, the third hypothesis, that larger layoffs cause a more negative stock market reaction than smaller layoffs, is rejected.

Table 16. Results of the OLS regression. In the regression, the dependent variable is CAR (-1, +5). N=384. *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % significance level.

Variable		**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Intercept		**-0,108*** **	0,025	-4,266	0,000
Reactive(D)		**-0,012** **	0,005	-2,544	0,011
LayRt		-0,010	0,021	-0,509	0,610
First(D)		0,007	0,005	1,317	0,188
ln(MV)		**0,005*** **	0,001	4,449	0,000
R-squared	0,083				
Adj. R-squared	0,073				

The coefficient for the first dummy is also statistically insignificant, which supports the results of the univariate analysis that there is no statistically significant difference in the stock market reaction between the company's first and subsequent layoff announcements. Thus, the fourth hypothesis that the company's first layoff announcement causes a more negative reaction than subsequent layoff announcements is rejected. The coefficient for the natural logarithm of the company's market value is positive and statistically significant at the 1 % significance level. This indicates that layoff announcements of companies with a greater market value result in higher (more positive) CARs than layoff announcements of companies with a lower market value. Thus, layoff announcements of companies with a lower market value, in turn, result in lower (more negative) CARs. This finding supports the results of the univariate analysis, and therefore the fifth hypothesis is accepted. Hence, it can be stated that the stock market reacts more negatively to the layoff announcements of smaller companies than to layoff announcements of larger companies. It should be noted, however, that the model is not the best fit model, as the explanatory power of the model, r-squared, is only moderate.

7 Conclusions

The purpose of the study was to examine the relationship between layoff announcements of companies and stock prices in the Finnish stock market during the period 2010–2019. The study period was intentionally limited to the end of 2019 due to the challenge caused by the corona pandemic from the perspective of the research topic. A total of 384 layoff announcements of companies listed on Nasdaq Helsinki were under examination. The layoff announcements were further divided into sub-samples based on the reason for the layoffs, the size of the layoffs, and the market value of the publishing company. The layoff announcements were also divided into two sub-samples based on whether the announcement was the company's first or a subsequent layoff announcement. As a research method, the event study method was used, and the abnormal returns were examined on the event window (-5, +5). Shorter event windows were also used in order to do a more detailed examination of the stock market reaction around the date of the event.

Based on previous research findings, five hypotheses were formed. Most of the previous studies have found that the stock market reacts negatively to layoff announcements, which is why H_1 states that the layoff announcements cause a negative stock market reaction. Regarding the reason for the layoffs, several previous studies have found that the stock market reacts more negatively to layoff announcements, for which the stated reason is declining demand or adverse market conditions. Thus, H_2 states that reactive layoff announcements cause a more negative stock market reaction than proactive ones. H_3, which states that larger layoffs cause a more negative reaction than smaller layoffs, is based on, among others, the findings of Hillier et al. (2007). Moreover, Ursel & Armstrong-Strassen (1995) and Hillier et al. (2007) have found that the stock market reacts more negatively to the company's first layoff announcement than to subsequent layoff announcements. Therefore, H_4 states that company's first announcement causes a more negative reaction than subsequent announcements. H_5, in turn, states that layoff announcements of smaller companies cause a more negative reaction than layoff announcements of larger companies, as Filbeck & Webb (2001) have found.

Of the study hypotheses, H_1, H_2, and H_5 are accepted, whereas H_3 and H_4 are rejected. For the entire sample, the results show that stock prices decline by an average of 0,80 % on the date of the event. On the three-day event window (-1, +1), the cumulative average abnormal return is -0,76 %. As both findings are statistically significant at the 1 % significance level, there is clear evidence that, in general, the stock market reacts negatively to layoff announcements and therefore H_1 is accepted. Moreover, abnormal returns are not observed before or after the event date, which supports the market efficiency and, on the other hand, indicates that there are no information leaks.

The results of the univariate analysis indicate that reactive layoff announcements cause a more negative reaction than proactive ones, as the average abnormal return of reactive layoff announcements is -1,37 % on the event date, while the average abnormal return of proactive layoff announcements is 0,28 %, which is statistically insignificant. Thus, the average abnormal return of reactive layoff announcements is 1,65 % more negative on the event date. For the cumulative average abnormal returns, the difference is 1,94 % on the event window (-1, +1). The differences in both AARs and CAARs are statistically significant at the 1 % significance level. The results of the OLS regression, with a dependent variable CAR (-1, +5), confirm the results of the univariate analysis. Since the coefficient for the reactive dummy is negative and statistically significant at the 5 % significance level, it can be stated that the stock market reaction is more negative for reactive layoff announcements, and therefore H_2 is accepted.

For the impact of the size of the layoffs on the stock market reaction, the results of univariate and multivariate analyses are fairly inconsistent. The results of the univariate analysis indicate that the stock market reacts more negatively to larger layoffs than smaller layoffs, as, on the event date, the average abnormal return is 0,59 % more negative for layoff announcements with a layoff ratio above the median of the full sample than for layoff announcements with a layoff ratio below the median of the full sample. The difference is statistically significant at the 5 % significance level. However, the results of the regression show that the size of the layoffs has no impact on the stock market reaction, as the negative coefficient for the layoff ratio is statistically insignificant. Thus, H_3 is rejected.

Both the company's first and subsequent layoff announcements cause a negative stock market reaction, but no statistically significant differences are observed on the announcement date or the following days. The regression results support the results of the univariate analysis, as the coefficient for the first dummy is positive and statistically insignificant. Thus, there is no evidence that the company's first layoff announcement causes a more negative reaction than subsequent layoff announcements, and consequently, H_4 is rejected.

The results of the univariate analysis indicate that the stock market reaction is more negative for layoff announcements of smaller companies. According to the results, the reaction is 0,73 % more negative on the event date for layoff announcements of companies with a market value below the median of the full sample. For the three-day event window (-1, +1), the difference in cumulative average abnormal returns is -0,85 %, also indicating a more negative reaction for layoff announcements of smaller companies. Both differences are statistically significant at the 1 % significance level. The regression results confirm the findings of univariate analysis, as the coefficient for the natural logarithm of the company's market value is positive and statistically significant at the 1 % significance level. The positive coefficient indicates that layoff announcements of companies with a greater market value result in higher (more positive) CARs than layoff announcements of companies with a lower market value. Thus, layoff announcements of companies with a lower market value, in turn, result in lower (more negative) CARs. Consequently, there is clear evidence that the stock market reacts more negatively to layoff announcements of smaller companies, and hence H_5 is accepted.

Overall, it is found that in Finland during the period 2010–2019, the stock market generally reacted negatively to layoff announcements causing economically significant losses to shareholders. Moreover, it is found that the reason for the layoffs had an impact on the reaction, and that the size of the publishing firm had an impact on the reaction. On the other hand, it is found that the size of the layoffs and whether the layoff announcement was the first or subsequent of the company had no effect on the stock market reaction. The research findings may be valuable to investors in forming expectations concerning possible future layoff announcements and their impact on stock prices.

The findings are mainly in line with previous studies, although the more negative reaction is not observed for the first layoff announcements and for larger layoffs, contrary to what Elayan et al. (1998) and Hillier et al. (2007) discovered. When looking at the cumulative average abnormal return of the full sample on a three-day event window (-1, +1), the results are nearly identical to those of Hillier et al. (2007). The CAAR of the full sample is -0,76 %, while Hillier et al. (2007) find the CAAR of -0,81 %. Consequently, the Finnish stock market seems to react as strongly to the layoff announcements as the UK stock market. The results are also similar for reactive and proactive sub-samples. On the same event window, the CAAR for reactive layoff announcements is -1,35 %, whereas the CAAR observed by Hillier et al. (2007) is -1,46 %. However, this study finds a slightly more positive stock market reaction to proactive layoff announcements than the study of Hillier et al. (2007), with the CAARs of 0,59 % and 0,20 %. On the other hand, if the results are compared, for instance, to the results of Capelle-Blancard & Tatu (2012), a more negative stock market reaction is observed for the full sample, as they find only a slightly negative and statistically insignificant CAAR of -0,17 %. As in this study, they also find a negative stock market reaction for reactive layoff announcements and a positive reaction to proactive layoff announcements. However, the reactions observed in their study are slightly stronger for both sub-samples.

Concerning further research, it would be interesting to examine how the layoff announcements affected stock prices over the past two years. However, as mentioned earlier, examining the phenomenon during a coronavirus pandemic is challenging and laborious, requiring a lot of resources. It would also be interesting to examine industry-specific differences in Finland in order to find out whether layoff announcements cause a particularly negative stock market reaction in certain sectors since Kunert et al. (2017) have shown that the reaction may be particularly negative in sectors that are highly dependent on intangible assets such as employees and their expertise. Finally, it would be important to study other possible factors explaining the stock market reaction, as the r-squared of the regression remained moderate.

References

Akerlof, G. A. (1970). The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics* 84:3, 488–500. https://doi.org/10.2307/1879431

Bodie, Z., Kane, A. & Marcus, A. (2014). *Investments*. 10th ed. Boston: McGraw-Hill Inc. 1090 p. ISBN 0–07–286178–9.

Brealey, R., Myers, S. & Allen, F. (2014). *Principles of Corporate Finance*. 10th ed. Irwin: The McGraw-Hill. 875 p. ISBN: 978–0–07–353073–4.

Capelle-Blancard, G. & Tatu, D. (2012). Stock market reaction to layoff announcements: European evidence (2002-2010). *Université de Paris*, 1, 1-31.

Copeland, T. E., Weston, J. F. & Shastri, K. (2005). *Financial Theory and Corporate Policy*. 4th ed. Boston: Pearson Addison Wesley. ISBN 0–321–22–353–5.

Elayan, F. A., Swales, G. S., Maris, B. A. & Scott, J. R. (1998). Market Reactions, Characteristics, and the Effectiveness of Corporate Layoffs. *Journal of Business Finance & Accounting* 25:3/4, 329–351. https://doi.org/10.1111/1468-5957.00190

Fama, E. (1965). The Behavior of Stock-Market Prices. *The Journal of Business* 38(1), 34–105. Retrieved from http://www.jstor.org/stable/2350752

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance* 25:2, 383–417. https://doi.org/10.1111/j.1540-6261.1970.tb00518.x

Fama, E. F. & French, K. R. (1993). Common risk factors on stocks and bonds. *Journal of Financial Economics* 33:1, 3–56. https://doi.org/10.1016/0304-405X(93)90023-5

Fama, E. F. & French, K. R. (2015). A Five Factor Asset Pricing Model. *Journal of Financial Economics* 116:1, 1–22. https://doi.org/10.1016/j.jfineco.2014.10.010

Filbeck, G. & Webb, S. E. (2001). Information Asymmetries, Managerial Ownership, and the Impact of Layoff Announcements on Shareholders Wealth. *Quarterly Journal of Business and Economics* 40:2, 31–47. Retrieved from https://www.jstor.org/stable/40473327

Gordon, M. & Shapiro, E. (1956). Capital Equipment Analysis: The Required Rate of Profit. *Management Science* 3:1, 102–110. Retrieved from https://www.jstor.org/stable/2627177

Gunderson, M., Verma, A. & Verma, S. (1997). Impact off Layoff Announcements on the Market Value of the Firm. *Industrial Relations* 52:2, 364–381. https://doi.org/10.7202/051170ar

Heikkilä, T. (2014). Tilastollinen tutkimus. 9th ed. Helsinki: Edita Prima Oy. 317 p. ISBN 978–951–37–6495–1.

Hillier, D., Marshall, A., McColgan, P. & Werema, S. (2007). Employee Layoffs, Shareholder Wealth and Firm Performance: Evidence from the UK. *Journal of Business Finance & Accounting* 34:3–4, 467–494. https://doi.org/10.1111/j.1468–5957.2007.02042.x

Iqbal, Z. & Shetty, S. (1995). Layoffs, Stock Price, And Financial Condition of The Firm. *Journal of Applied Business Research* 11:2, 67–72. https://doi.org/10.19030/jabr.v11i2.5876

Jensen, M. & Mecklin, W. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics* 3:4, 305–360. https://doi.org/10.1016/0304-0405X(76)90026-X

Kauppalehti (2022). Uutiset. Available from: https://www.kauppalehti.fi/uutiset

Kendall, M. (1953). The Analysis of Economic Time Series, Part I: Prices. *Journal of the Royal Statistical Society* 116:1, 11–34.

Knüpfer, S. & Puttonen, V. (2014). *Moderni rahoitus*. 7th ed. Talentum Media Oy. 272 p. ISBN 978–952–14–2312–3.

Kunert, S., Schiereck, D. & Welkoborsky, C. (2017). Stock market reactions to layoff announcements – analysis of the renewable energy sector. *International Journal of Energy Sector Management* 11:2, 311-328. https://doi-org.proxy.uwasa.fi/10.1108/IJESM-02-2016-0004

Lee, P. M. (1997). A Comparative Analysis of Layoff Announcement and Stock Price Reactions in the United States and Japan. *Strategic Management Journal* 18:11, 879–894. https://doi.org/10.1002/(SICI)1097-0266(199712)18:11<879::AID-SMJ929>3.0.CO;2-V

Lin, J. & Rozeff, M. S. (1993). Capital Market Behavior and Operational Announcements of Layoffs, Operational Closings, and Pay Cuts. *Review of Quantitative Finance and Accounting* 3:1, 29–45. https://doi.org/10.1007/BF02408411

Lo, A. W. & Mackinlay, A. C. (2002). *A Non-Random Walk Down Wall Street*. 5th ed. Princeton University Press.

MacKinlay, A. C. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature* 35:1, 13–39. Retrieved from http://www.jstor.org/stable/2729691

Malkiel, B. G. (2007). *A Random Walk Down Wall Street: The Time-Tested Strategy for Successful Investing* (Rev. ed.). New York: W. W. Norton.

Marshall, A., McColgan, P. & McLeish, S. (2012). Why Do Stock Prices Decline in Response to Employee Layoffs? UK Evidence from the 2008 Global Financial Crisis. *The Journal of Financial Research* 35:3, 375-396. https://doi.org/10.1111/j.1475-6803.2012.01321.x

Narayan, P. K. & Smyth, R. (2005). Are OECD Stock Prices Characterized by a Random Walk? Evidence from Sequential Trend Break and Panel Data Models. *Applied Financial Economics* 15:8, 547-556. https://doi.org/10.1080/0960310042000314232

Nikkinen, J., Rothovius, T. & Sahlström, P. (2002). *Arvopaperisijoittaminen*. 1st ed. Helsinki: WSOY. 244 p. ISBN 951–0–26627–2.

Palmon, O., Sun, H.L. & Tang, A.P. (1997). Layoff announcements: Stock market impact and financial performance. *Financial Management* 26:3, 54–68. https://doi.org/10.2307/3666213

SAK (2020). Irtisanomisten ja yt-neuvottelujen vertailut 2007–2019. Available from: https://www.sak.fi/aineistot/tutkimukset/irtisanomisten-ja-yt-neuvottelujen-vertailut-2007-2019

SAK (2020). Irtisanomisten ja yt-neuvottelujen vuositilastot 2006–2020. Available from: https://www.sak.fi/aineistot/tutkimukset/irtisanomisten-ja-yt-neuvottelujen-vuositilastot-2006-2020-syyskuu

Samuelson, P. A. (1965). Proof That Properly Anticipated Prices Fluctuate Randomly. *Industrial Management Review* 6:2, 41–49.

Sharpe, W. F. (1964). Capital asset prices: A theory of Market Equilibrium Under Conditions of Risk. *Journal of Finance* 19:3, 425–442. https://doi.org/10.1111/j.1540-6261.1964.tb02865.x

Shleifer, A. (2000). *Inefficient Markets: An Introduction to Behavioral Finance*. 1st ed. New York: Oxford University Press Inc. 224 p. ISBN 0–19–829227–9.

Ursel, N. & Armstrong-Stassen, M. (1995). The impact of layoff announcements on shareholders. *Industrial Relations* 50:3, 636–649. Retrieved from https://www.jstor.org/stable/23074159

Vaihekoski, M. (2004). *Rahoitusalan sovellukset ja Excel*. Helsinki: Werner Söderström Osakeyhtiö. 341 p. ISBN 951–0–29067–X.

Williams, J. B. (1938). The Theory of Investment Value. *Harvard University Press* pp. 55–75.

Worrell, D. L., Davidson III, W. N. & Sharma, V. M. (1991). Layoff Announcements and Stockholder Wealth. *Academy of Management Journal* 34:3, 662–678. https://doi.org/10.2307/256410