Impact of negative announcements on share prices

- A quantitative study of two Swedish companies
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Abstract

Accounting fraud is a common problem in the society and the number of accounting frauds has increased enormously during the last decade. This issue affects a lot of stakeholders in a negative way, such as investors, employees and competitors. Especially, there will be an impact on the investors of the involved company already from the announcement of the fraud in the form of negative changes in share prices. In addition, a negative reputation of a company can have negative effects on the company's auditing firm. It has been argued that the possible consequences of accounting fraud need to be investigated further, in order to see the whole picture of the damages caused by this. Therefore, this study enhances the research field about consequences of accounting fraud by investigating if announcements connected to accounting fraud affect share prices of companies that operate in the same industry sector and are audited by the same auditing firm as the company involved in the announcement. The study chooses to examine this question from an investor´s point of view by investigating announcements of two Swedish companies, namely Prosolvia and Eniro. The study uses the event study methodology, and more specifically the market model, to answer the research questions. The study finds no statistically significant results for that the share prices of companies connected to Prosolvia and Eniro should be negatively affected or differently affected because of having the same auditing firm as the company involved in the announcement.
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1 Introduction

In this section, the study explains the background of the research problem and describes how this study contributes to the knowledge in the society. This section also introduces the topics researched in this study and presents the motivation behind the chosen research questions.

1.1 Background

Accounting fraud can have an adverse effect on all stakeholders connected to the company involved, including investors, employees, suppliers and competitors (Coombs, 2007; Bhasin, 2013). For example, the Enron accounting fraud ultimately led to the bankruptcy of this company as well as the demise of Arthur Andersen, the company’s audit firm (Giroux, 2008). Moreover, the accounting fraud of Enron led to reputational losses that affected the auditor to the extent that Arthur Andersen went out of business (Zahra, Priem & Rasheed, 2005). In response to the Enron debacle, the Sarbanes Oxley Act (SOX) was enacted to prevent similar scandals in the future (Kranacher & Riley, 2019).

There will be an impact on the investors already from the announcement of the accounting fraud in the form of negative changes in share prices (Agrawal & Chadha, 2005). The European Union adopted new rules regarding statutory audit, effective from 2016, in order to increase the investor protection. The purpose of this new regulation was to increase audit quality and keep financial statements more transparent (European Commission, 2016). In spite of the new rules, notifications of accounting fraud have continued to increase in Sweden both before and after the implementation of the new regulation (Ekobrottsmyndigheten, 2019).

The standard International Standard on Auditing (ISA) 200 states that an audit should increase the level of certainty concerning the financial statements’ validity for the benefit of stakeholders. Furthermore, ISA 200 requires the auditor to achieve a high level of assurance that the financial statements overall not contain material misstatements that may be caused by errors or fraud (International Auditing and Assurance Standards Board [IAASB], 2009a). Because of this, stakeholders usually think it is more important to know who the auditor is instead of the CEO or CFO when accounting fraud is announced. In addition, the auditors are
often also involved in the fraud case if they are accused of not having detected errors that arise from fraud (Awolowo, Garrow, Clark & Chan, 2018).

1.2 Problem

Past studies have shown that companies that are subject to restatement announcements experienced a decrease in share prices right after the announcement (Palmrose, Richardson & Scholz, 2004; Beatty, Bunsis & Hand, 1998). In addition to restatement announcements, announcements about IT securities breaches and accounting fraud has led to a decrease in the involved companies´ own share prices (Garg, Curtis & Halper, 2003; Cox & Weirich, 2002).

A contagion effect takes place when “an adverse event at one firm also conveys negative information about the valuation of other firms” (Gleason, Jenkins & Johnson, 2008, p. 87). Akhigbe, Madura and Newman (2006) argued that if the change in share prices is due to a contagion effect, both the share prices of the company involved in the scandal and the share prices of companies with a connection to the first company, will move in the same direction. Examples of these connections are companies that are located in the same geographical area, have the same customers or operate within the same industry. Hence, a decrease in the share prices of the company involved in a negative announcement, could lead to a decrease in the share prices of other companies audited by the same auditing firm.

Several studies have investigated how negative announcements about companies have affected share prices of companies that are connected in some way to the company involved in the announcement (Jordan, Peek & Rosengren, 2000; Kang, 2008; Bhasin, 2013). For example, according to Beatty, Bunsis and Hand (1998) the reputation of an underwriter and the reputation of the underwriter´s clients are positively related to each other because negative announcements regarding a firm's underwriter will also have a negative impact on the firm.

Investors´ investments are an important source of financial capital for companies. Hence, if investors avoid to invest money because of fear to be affected of another company´s accounting fraud, this can also hurt the companies that are not involved in the scandal. In order to keep the trust of the investors, it is important to investigate how and if one company can affect connected companies. In addition, share prices are crucial for investors, since they reflect the investment’s
market value and therefore also the company’s wellbeing (Scholes, 1972; Barber & Odean, 2013). Therefore, it is important for investors to know how accounting fraud affects the share prices of connected companies. Furthermore, it has not been much explored how accounting fraud affects other companies' share prices. Moreover, Bhasin (2013) stated that in order to reduce the number of accounting frauds in the future, they need to be studied with the goal to enhance the knowledge about their consequences. One negative consequence could be effects on other companies’ share prices, why this question needs to be investigated further.

This study perhaps not only will interest investors, but also policy makers, such as Ekobrottsmyndigheten (the Swedish Economic Crime Authority) and Föreningen för god sed på värdepappersmarknaden (the Association for Generally Accepted Principles in the Securities Market), if the consequences of an accounting fraud continues to be proved to be understated. If an accounting fraud appears to have larger social costs and consequences than what is known today, it would be even more important to strengthen the regulation with regards to financial reporting in order to decrease the risk of a new accounting fraud (Kang, 2008). Hence, the study contributes to the accounting field by investigating the consequences of accounting fraud in order to improve the understanding of the possible downsides.

1.3 Purpose

Previous research has mainly focused on consequences of accounting fraud in the United States (Enron, Worldcom), Italy (Parmalat) and the United Kingdom (Polly Peck) (Giroux, 2008; Jones, 2011). However, this study investigates the possible consequences of accounting fraud from a Swedish perspective. Hence, the study chooses to investigate the impact of two announcements connected to accounting fraud which involve the two Swedish companies Prosolvia and Eniro. The study considers an announcement connected to accounting fraud to be a negative announcement. The study chooses these announcements since Prosolvia and Eniro operate within two different and broad industries, the technology and consumer services sector respectively, and the scandals took place during different time periods, namely in 1998 and in 2014. Moreover, the announcements connected to the two accounting frauds were different.
In 2013, national press announced that Prosolvia’s auditing firm, PwC, would pay 742,5 million SEK to Prosolvia’s bankruptcy estate, which originated from an accounting fraud committed by Prosolvia in 1998 where PwC was accused of performing an inaccurate audit (Affärsvärlden, 2013; Haddäng, 2013). In 2014, it was announced by national press that major accounting errors had been found in Eniro’s financial reports, which the company’s auditing firm, PwC, partly could be blamed for (Micanovic, 2014, Helander, 2014).

This study fills a gap in the literature by investigating how Swedish companies are affected by negative announcements that concern other companies. Furthermore, no other study with a Swedish setting has investigated and compared two different companies that have been involved in announcements connected to accounting fraud.

The foregoing discussion leads the study to formulate the two research questions below;

“*How does announcement connected to accounting fraud which involves a specific company affects the share prices of other companies that operate within the same industry sector as the company involved in the announcement?*”

“*Are share prices of companies that operate within the same industry sector as the company involved in the announcement, differently affected by the announcement if they use the same auditing firm as the involved company, compared to if they use another auditing firm?*”

Based on the research questions, the study develops the following four null hypotheses;

\( H_{0P1} \): Share prices of the individual companies connected to Prosolvia are not affected by the announcement of PwC’s payment obligation to Prosolvia’s bankruptcy estate.

\( H_{0E1} \): Share prices of the individual companies connected to Eniro are not affected by the announcement where Eniro is accused of committing accounting fraud.

\( H_{0P2} \): Share prices of companies within the technology sector that are audited by PwC are not differently affected by the announcement of PwC’s payment obligation to Prosolvia’s bankruptcy estate compared to the share prices of companies audited by another auditing firm.
H_{0E2}: Share prices of companies within the consumer services sector that are audited by PwC are not differently affected by the announcement where Eniro is accused of committing accounting fraud compared to the share prices of companies audited by another auditing firm.

In section 2, the study reviews the existing literature within this field of research, which is needed in order to answer the research questions. Section 3 describes the data collection and methodology used to conduct the study. Next, Section 4 shows the results of the study. Section 5 analyses the results with the literature review as a basis and Section 6 presents the main conclusions. In Section 7 the study discusses societal and ethical effects of the study and gives suggestions for future research within this topic.
2 Frame of references

This section includes a review of the most relevant literature regarding the efficient market hypothesis, the event study methodology and the impact of announcements on share prices. This section also gives the reader an insight into the consequences of accounting fraud and the auditing firm’s role in detecting accounting fraud. Furthermore, this section also provides a short description of the two companies investigated in this study.

2.1 Theoretical framework

2.1.1 Efficient market hypothesis

A market is called efficient if the share prices in the market always fully reflect the information that is available (Malkiel & Fama, 1970). The theory has mainly been built-up on empirical work, meaning that the studies were conducted before the theory was developed. There are three different types of tests that have been conducted within the area of efficient market hypothesis. The first type of studies conducted are called weak form tests. These are based only on information from historical prices or returns (Malkiel & Fama, 1970).

Evidence from research in the 1950’s and 1960’s showed that the behaviour of speculative prices, such as common stocks, indicated a random walk. Therefore, the efficient market hypothesis was first denoted with regards to random walks (Malkiel & Fama, 1970). The random walk corresponds to the fact that new information is unpredictable. If the current share prices should reflect all available information in the market, including new information, the share prices should also change unpredictable or randomly. Consequently, it has been argued that share prices should follow a random walk (Fama, 1995). Fama (1995) stated that one of the assumptions behind the random walk theory is the independence of share price fluctuations to each other. Therefore, according to the random walk model, which the efficient market hypothesis is based on, it should not be possible to predict future share prices by using historical share prices. This can be compared with throwing a dice twice. The second throw will be independent of the result from the first throw, which corresponds to a random process. Hence, if the market does not follow a random walk, the market is not efficient and the efficient market hypothesis cannot be supported.
The second type of tests made within this field was first called semi-strong form tests, but has later on been called event studies (Fama, 1991). They were developed when the weak form tests seemed to promote the efficient market hypothesis. These tests should investigate how fast prices or returns changed with regard to publicly available information, such as announcements of annual reports. The third type of tests that appeared last were the strong form tests. The goal with these tests was to investigate the case in which any investor or group had monopolistic access to information that cause the prices to change (Malkiel & Fama, 1970).

Malkiel and Fama implied in their paper from 1970, that there was no important evidence against the efficient market hypothesis at this time, at least not for the weak form tests and the semi-strong tests. The authors also said that there was only limited evidence in the strong form tests against the efficient market hypothesis. However, in the end of the second millennium, the efficient market hypothesis was questioned. Financial econometricians have meant that share prices can be predicted to a significant degree by using for example past returns or price-earning ratios (Malkiel, 2005). Moreover, Fama and French (1988) concluded in their research that share prices in the US were mean reverting. Lo and MacKinlay (1988) used weekly returns in the equity market in order to compare the variance estimators. They strongly rejected the random walk hypothesis for the whole sample period, ranging from 1962 to 1985. Moreover, Campbell and Schiller (1988) showed that it is possible to predict the stock return by using the ratio of the moving average of earnings and the current stock price. Smith and Ryoo (2003) investigated the hypothesis of random walks in five European equity markets. The authors found autocorrelation in the returns in four of these countries and therefore the random walk hypothesis was rejected.

The random walk hypothesis has also been studied and rejected in a Swedish setting. Frennberg and Hansson (1993) used a sample consisting of monthly data from the Swedish equity market for the years 1919-1990 and conducted the variance ratio test and the test of autoregressions of multiperiod returns. The authors concluded that the random walk hypothesis could not be supported for the Swedish equity market during this period.

The findings discussed in the two paragraphs above are not in accordance with the research made in the 1970’s regarding the efficient market hypothesis. In return to these opponent studies Malkiel (2005), who has preached the efficient market hypothesis since the 1970’s, meant that since professional investors do not overcome the market, the market is efficient.
Moreover, Tóth and Kertész (2006) concluded in their research that the New York Stock Exchange market becomes more efficient. Wilson and Marashdeh (2007) argued that it is possible to earn returns above the average in the short run due to arbitrage opportunities. Hence, the authors argued that the market is inefficient in the short run, but due to the elimination of arbitrage opportunities, the market will be efficient in the long run. However, Lee, Lee and Lee (2010) explored if the efficient market hypothesis is equivalent between different economic development levels. 32 developed countries and 26 developing countries were included in the study and the authors concluded that the real share price series were stationary in all the countries, which is not in accordance to the efficient market hypothesis.

According to Ţiţan (2015) and Hirshleifer, Hsu and Li (2013) one explanation for why the efficient market hypothesis might not be true is that investors are negligent. They are not immediately aware of new information that is given to them and the new information is therefore not always instantly reflected in the market. This inattention among investors can cause delayed share price changes connected to event announcements which in turn will make it easier for investors to predict future returns.

In conclusion, there still does not exist a clear opinion about the truth of the existence of the efficient market hypothesis.

2.1.2 Event study methodology

The event study methodology was introduced by Fama, Fisher, Jensen and Roll in 1969. The method was used to test the time it takes for share prices to change due to specific types of new information. This is a type of semi-strong form test and semi-strong form tests were developed in order to extend the research field about the efficient market hypothesis (Malkiel & Fama, 1970).

Fama et al. (1969) tested how share prices changed with regards to share splits. In order to conduct their research, the authors needed to isolate the effect that splits perhaps could have on returns. Hence, the general market conditions needed to be abstracted from the returns during the time periods that were close to the share splits. Therefore, the authors used a linear regression model to explain the relationship between the general market conditions and the
monthly rates of returns of the different shares. Next, the authors calculated the average difference in share prices between the months due to the event of a share split. They also calculated the cumulative average residual, which corresponds to the cumulative effects of abnormal behaviour of the returns in the months close to the split month.

Fama et al. (1969) stated that one of the assumptions of the error term in the linear regression model used in event study methodology is that the error terms are serially independent. In contrast to this, the authors found strong evidence that the expected values of the error term are rather not zero during the time surrounding the share splits. Consequently, the error term in the model is therefore not valid. Moreover, they found evidence that the separate effect on returns from the announcement of a split was completely mirrored by the share price, at least in the end of the month when the split occurred, but more probably right after the announcement. The authors also concluded in their study that the market is efficient (Fama et al., 1969).

Boehmer, Musumeci and Poulsen (1991) stated that the event study methodology has become the most important method to use when investigating the effect of an event on returns of shares. An event can be defined as “anything that results in new relevant information” (McWilliams & Siegel, 1997, p. 630). Examples of such events are implementation of new corporate governance reforms (Black & Khanna, 2007), new patents (Austin, 1993), announcement regarding mergers and acquisitions (Ma, Pagan & Chu, 2009), and privacy breaches (Acquisti, Friedman & Telang, 2006).

Event study methodology is based on three assumptions (i) markets are efficient, (ii) the event is unexpected, and (iii) confounding effects are isolated (McWilliams & Siegel, 1997). The first assumption, market efficiency, means that the effects, positive or negative, of an event should be directly reflected in the company's share prices. The second assumption implies that an event is considered to be unexpected if the market is completely unaware of the information prior to the event. Sometimes information about the event is leaked to investors beforehand, which makes the results obtained from the event study invalid. The third assumption claims that no confounding effects can have appeared during the time of the event window for the results to be valid. Confounding effects include all other kinds of events that can have an effect on share prices, for instance the announcement of a new company product or a change in a key executive (McWilliams & Siegel, 1997).
The goal with the event study methodology is to come up with and calculate the cumulative abnormal returns (CARs) for the event that is investigated (McWilliams & Siegel, 1997). The CAR measure has been used in several studies investigating the effect of events concerning one company, on share prices of connected companies (Jordan, Peek & Rosengren, 2000; Donelly, 2008; Jamal, Liu & Luo, 2018; Kang, 2008).

Figure 1. The event study period

![Event Study Period Diagram]

The event date is the date when the investigated event occurred (Figure 1). The event date can be quite complicated to determine because sometimes there is a distinction between when the event occurred and when the event was announced to the market (Henderson, 1990). The event window can be defined as “the event day plus and/or minus some number of days, weeks or months when the sample firms’ returns are observed to see if anything unusual happened” (Henderson, 1990, p. 284; Figure 1). A short event window, normally two days, are chosen in event studies where the date of the event can be accurately determined. A short event window indicates more valid abnormal returns (Armitage, 1995). In addition, a short event window is more complied with the efficient market hypothesis that assumes that the effect of an event will be directly shown in the market (Ding, Lam, Cheng & Zhou, 2018). Choosing a long event window will therefore more easily abandon the underlying assumption of the efficient market hypothesis. The event window can be hard to specify because the range needs to include all the relevant changes in share prices without reaching too long into the future (Kothari & Warner, 2007).

The estimation window is needed in order to be able to calculate the normal returns for the time period following the estimation window (Kang, 2008; Figure 1). Normal returns are the returns that would be most probable if the event would not have occurred (Henderson, 1990). According to Peterson (1989), a sufficient estimation window should range between 100 and 300 trading days. However, estimation windows lasting 250 trading days, which corresponds to one year, are most often chosen (Armitage, 1995). For the results to be as valid as possible,
the estimation window and the event window should not be overlapped (MacKinlay, 1997). The estimation window and the post event window is equal in time length, since the data collected corresponds to the same number of days before and after the event date (Figure 1).

The event study methodology has developed in several aspects since its beginning in 1969. The methodology has been divided into two approaches, namely short term event studies and long term event studies. However, a formal distinction between the two does not yet exist. Kothari and Warner (2007) did an overview of event study methodology where they investigated 565 papers published between 1974 and 2000. The authors found that the short term event studies were used when the event window was one year or shorter. Long term event studies (with event windows longer than one year) on the other hand, has also been widely used but researches have noticed several limitations such as the lack of validity of the statistical results (Eckbo, 2007) and the increased risk of confounding events (Ding et al., 2018).

Fama et al. (1969) and Brown and Warner (1980) used data based on monthly returns in their studies. A few years later, in 1985, Brown and Warner along with other researchers began to base their data on daily studies instead (Corrado, 2011). French, Schwert and Stambaugh (1987) stated that monthly returns failed to reflect the individual fluctuations, which can be obtained from daily returns that show more frequent changes. Moreover, Kothari and Warner (2007) mentioned that daily returns result in more informational research about the impact of announcements and also give more accurate measurements of abnormal returns, compared to when monthly returns are used.

To conclude, the event study methodology has been widely used during recent years and several models for how to calculate the abnormal returns have been developed and are continuously improved (Corrado, 2011). The author further mentioned that because event study methodology is frequently used within numerous fields of research, such as accounting, finance, law, management and marketing, there still does not exist a model that fits all situations. The choice of model therefore instead depends on the individual situation.
2.2 Literature review

2.2.1 Fraud

The financial statements can contain misstatements. These misstatements can proceed from error or fraud. However, the difference between error and fraud is that fraud arises from an intentional action and an error is an unintentional mistake (IAASB, 2009b). In addition, the 11th chapter, paragraph 5 in Brottsbalken states that accounting fraud is committed when the company’s accounting is based on false documents or actions that make the accounting misleading so the accounts no longer reflect the real picture of the company (SFS 1962:700).

2.2.2 Impact of announcements on share prices

2.2.2.1 Consequences for the company involved

The impact of announcements on share prices has been researched extensively in previous years along different perspectives such as announcements concerning mergers and acquisitions (Ma, Pagan & Chu, 2009), restatements (Palmrose, Richardson & Scholz, 2004), celebrity endorsements (Agrawal & Kamakura, 1995) and fraudulent actions (Cox & Weirich, 2002; Kukreja & Gupta, 2016).

Palmrose, Richardson and Scholz (2004) researched negative announcements’ effect on company’s share prices by examining restatement announcements with regard to stock market reactions. Over a 2-day event window, they found that the share prices decreased by 9% on average among the 403 firms in their sample. They also found that when the restatements concern fraud, even larger decreases in share prices are seen. In addition, larger decreases in share prices were also seen when the restatements were attributed to the auditor. In a more recent study, Agrawal and Cooper (2017) found that restatement announcements caused an average share price decline between 10,4% and 20,8% for the companies involved.

Cox and Weirich (2002) investigated the market reaction for companies that had announced accounting fraud. Their statistically significant results showed that for the sample consisting of 31 companies, the share prices declined with 23,2% in average during a 1-day event window.
In a more recent international accounting fraud, the British company Tesco revealed in 2014 that its profits had been overstated with £260 million (Awolowo et al., 2018). The aftermath of their accounting fraud resulted in that Tesco had its lowest share price in 11 years, since the company experienced a share price decline of 6.5% at the end of the announcement date (Kukreja & Gupta, 2016). The authors further described that already in 2011, Tesco’s investors got warned about the company’s financial status through a profit warning and in 2014 PwC, Tesco’s auditing firm at the time, warned the auditing committee to monitor the recognition of income more thoroughly, which later could have minimized the magnitude of Tesco’s overstatement. In accordance with the event study methodology, the share prices might have been even more affected if the announcement would have been more unexpected for the investors (McWilliams & Siegel, 1997).

Karpoff and Lott (1993) showed that when companies were accused of financial reporting fraud, this corresponded to a significant average decline in the market value of 4.66% over a two-day event window after the announcement. The authors explained that this decline primarily was due to the lost reputation of the firms, where investors feared that the companies would commit financial reporting fraud in the future as well.

According to Kang (2008) companies’ lost reputation can be reflected in a lower market value. Moreover, the decline in market value, which can be seen as a reputational penalty, might lead to changes in investors’ expectations regarding prospective earnings (Kang, 2008). The author further said that when a company is accused of financial reporting fraud, the trust of this company’s accounting practices is diminished. In addition, Palmrose, Richardson and Scholz (2004) meant that when a company conducts fraud, this behaviour signals a lack of management integrity among the managers of the firm. The information asymmetry between managers and investors increases when the trust of the managers decreases. In turn, this can lead to more negative share prices.

2.2.2.2 Effects on connected companies’ share prices
The previous section provided an insight into what kind of effects negative announcements can have on the share prices of the company involved in the announcement. Henceforth, the study describes how connected companies’ share prices are affected by negative announcements.
Kang (2008) conducted a study where he investigated how the share prices of companies that were connected through director interlocks were affected by one company’s accounting fraud. The study consisted of 244 connected companies and 30 fraudulent companies and the author concluded that 18.4% of the connected companies experienced a significant decline in their share prices. The author further analyzed that the connected companies were more likely to experience negative effects on their share prices when they were run by poorly structured corporate governance, which in this case did not prioritize the investors’ interests.

Gleason, Jenkins and Johnson (2008) published a study where they investigated whether accounting restatements in one company had an effect on the share prices of non-restating companies operating within the same industry sector. The authors found a small, but statistically significant decline in the share prices of the non-restating companies and they showed that the size of the restating company had an impact on how much the share prices of the non-restating companies were affected. A larger company’s restatement had a bigger effect on the share prices of the non-restating companies in that industry. When the authors analyzed their results, they further stated that the study might have received different results if the research regarding finding confounding effects would have been made more thoroughly.

Bhasin (2013) investigated the case of Satyam Computers Limited. In 2009 it was announced that the company’s assets had been overstated with $1.47 billion for the last couple of years, and the company’s CEO had created 6000 salary accounts for employees that did not exist. Satyam’s own share prices declined with 70% and Satyam’s investors could not understand how the auditing firm, PwC, could have failed to detect errors of that magnitude. It was thereafter investigated that 100 companies audited by PwC at that time, experienced a share price decline between 5% and 15%.

Jamal, Liu and Luo (2018) published a study where they researched how the announcement regarding an accounting fraud committed by Kelon, a chinese manufacturing company, affected the share prices of the auditing firm’s (Deloitte) other clients, and also the effect on the share prices of other Big4 auditing firms’ clients. In 2005 it was announced that Kelon was investigated by China Securities Regulatory Commission because they were accused of recognizing revenues incorrectly and making untraceable transactions and Deloitte got the blame. The authors found that the share prices for companies having Deloitte as their auditing
firm decreased more than the share prices of companies having other Big4 auditing firms, with CARs ranging from -2 % to -4,3 % compared to CARs only ranging from -1,2 % to -2 %. The authors also found that companies that used the same auditing firm and operated in the same industry sector as Kelon were highly affected by Kelon’s accounting fraud with CARs ranging from -3,4 % to -6,3 %.

2.2.3 Consequences of accounting fraud

As mentioned previously in this study, accounting fraud can have an adverse effect on all stakeholders connected to the company involved, such as investors, employees, suppliers and competitors (Coombs, 2007; Bhasin, 2013). Below the study discusses negative consequences of accounting fraud, in addition to changes in share prices, for the company and its stakeholders.

According to the studies conducted by Karpoff and Lott (1993) and Desai, Hogan and Wilkins (2006) reputational losses is one of the major consequences of accounting fraud. Karpoff and Lott (1993) investigated the market´s reaction to accounting fraud and described that the share price decrease was due to the reputational loss, where investors were afraid that the company would conduct fraudulent actions in the future as well. However, Desai, Hogan and Wilkins (2006) chose a different approach regarding reputational loss where they primarily investigated the consequences for the managers. The authors found that for 60 % of the companies in their study, at least one senior manager lost his or her job position within 2 years following a restatement announcement. Additionally, Bhasin (2013) mentioned that in many cases, executives are the ones proven guilty for the accounting fraud, and thereby they have to pay large fines and even get imprisoned. The author further stated that the reputational loss of the fraudulent company might spread onto the company´s auditing firm and innocent competitors.

Agrawal and Chadha (2005) published a study where they mentioned that many companies that announce accounting fraud usually reach the point where they have to file for bankruptcy. A bankruptcy primarily hurts employees who lose their jobs and the companies’ investors who lose their money (Zahra, Priem & Rasheed, 2005). The reason why fraudulent companies end up in bankruptcy might be the major costs that arise from lawsuits connected to the accounting fraud, filed by upset stakeholders such as investors, customers and employees.
Another consequence of the increasing number of accounting frauds reported that affects both several stakeholder groups and uninvolved companies is the implementation of new laws, such as the Sarbanes Oxley Act (Kranacher & Riley, 2019) and the new regulation for countries in the European Union with the aim to prevent accounting fraud (European Commission, 2016). Furthermore, Zahra, Priem and Rasheed (2005) mentioned that the government is also affected by accounting fraud, because of the incorrect amount of tax revenue collected.

In 2002, after the major accounting frauds occurred in the beginning of the 2000’s, such as the frauds committed by Enron and Worldcom, the Sarbanes Oxley Act was enacted into the US legislation. The aim of the Sarbanes Oxley Act was to enhance investor protection by implementing more and stricter rules regarding internal controls, evidence conservation and more stringent sanctions for accounting fraud (Kranacher & Riley, 2019). However, the effect of the implementation was not as expected. In the years following the implementation of the Sarbanes Oxley Act, the amount of detected accounting frauds increased remarkably. The reason could either have been that the amount of accounting frauds actually increased, or that more accounting frauds got detected due to the new stricter rules (Hogan, Rezaee, Riley & Velury, 2008).

Accounting fraud has been a big problem in Sweden during the last decade with increasing amounts of reported accounting frauds ranging from 8942 in 2008 to 21030 in 2018 (Brottsförebyggande Rådet, 2019; Ekobrottsmyndigheten, 2019). Rules similar to the Sarbanes Oxley Act were therefore implemented into the European countries with the purpose to prevent the occurrence of accounting frauds. For example, in 2016 the European Union implemented new rules regarding statutory audit, which aimed at increasing auditing quality and thereby keeping financial statements more transparent so that existing investors and possible investors would be able to make investment decisions based on correct information (European Commission, 2016). However, the aftermath of the new legislation did not turn out as intended. Ekobrottsmyndigheten recently released a report where they showed that since 2016, when the new rules were implemented, the amount of reported accounting frauds have increased significantly each year (17296 in 2016, 18635 in 2017 and 21030 in 2018) (Ekobrottsmyndigheten, 2019). Important to mention is that even though there is a significant increase in the accounting frauds reported, many cases are probably still under the radar. According to Ekobrottsmyndigheten (n.d.) a company’s accounting is very important for
investors, since this is the underlying information they use to make their investment decisions. Therefore, when the number of accounting frauds reported in Sweden are continuously increasing, investors keep suffering.

2.2.4 The auditing firm’s role in detecting accounting fraud

The ISA 200 requires the auditor to achieve a high level of assurance that the financial statements overall do not contain material misstatements that may be caused by errors or fraud. An audit should also increase the level of certainty concerning the financial statements’ validity among stakeholders that will use the financial statements (IAASB, 2009a). Hence, the main function of auditors is to protect the interest of investors (Newman, Patterson and Smith, 2005). When a company commits accounting fraud which is not detected by the company's auditor, it can be argued that the auditing firm has not performed a sufficiently good review and therefore the auditing firm can be involved in the fraud case as well (Awolowo et al., 2018).

As previously mentioned in the study, the number of reported accounting frauds is increasing in Sweden (Ekobrottsmyndigheten, 2019). Even though one might assumes that auditors are the actors who detect the majority of the accounting frauds, that was not the case in the study conducted by Dyck, Morse and Zingales (2010). The authors found that employees, the media and non-financial-market regulators detected more cases of fraudulent accounting than the auditors did. Because the responsibility of the auditors is to verify the quality of financial statements, the stakeholders usually first wants to find out who the auditor is when a company’s accounting fraud is announced instead of first identifying the CEO or CFO (Awolowo et al., 2018).

Auditing firms sell services and their growth and success is therefore solely based on their reputation. The reputation can be affected when the audit quality deteriorates from the public’s point of view, for example when the auditing firm fails to detect companies’ accounting fraud and get involved in a lawsuit or when the auditing firm loses important clients (Ball, 2009). In 2009 it was announced that the Indian company Satyam had committed accounting fraud (Bhasin, 2013) and nine years later, in 2018, it was decided that their auditing firm PwC would be banned from auditing Indian listed companies during the two forthcoming years (White, 2018). However, the effect of Enron’s accounting fraud on its auditing firm Arthur Andersen
was even larger. Because of their major reputational loss that occurred since they failed to detect and report the fraud, Arthur Andersen went out of business along with its client (Zahra, Priem & Rasheed, 2005). According to Agrawal and Cooper (2017) the auditing firm is the actor who gets replaced first after an announcement about accounting fraud, because the fraudulent company tries to regain its reputation and trust towards its stakeholders.

Important to mention though, is that although auditing firms in many cases get accused of not performing its responsibilities when they fail to detect their clients’ accounting frauds, Hansen, McDonald, Messier, and Bell (1996) believed that the accounting fraudulent actions can sometimes be so discreet that auditors find it difficult to detect them.

2.3 The companies investigated in this study

This study chooses to investigate announcements connected to accounting fraud for two Swedish companies, Prosolvia and Eniro. Swedish companies are chosen instead of foreign companies due to the lack of studies conducted with a Swedish setting within this field of research. An announcement connected to accounting fraud is considered to be a negative announcement.

2.3.1 Prosolvia

In 1998, it was announced to the market that the IT company Prosolvia was accused of committing accounting fraud. The effect of the accounting fraud led to its bankruptcy later that year (Söderlind, 2013). During the forthcoming years, the two parties (PwC and Prosolvia’s bankruptcy estate) were involved in a long lasting lawsuit where the district court judged that the accounting of Prosolvia was fraudulent and where the court of appeal further judged that PwC’s faulty guidance was the reason for Prosolvia’s accounting fraud and its downfall (Haddäng, 2013).

However, before the case got issued in supreme court, the two parties reached a solution (SvD, 2013). In the 24th of September 2013, after 15 years of disagreement about who should be responsible for the downfall of Prosolvia, it was decided through an out of court settlement that PwC must pay 742,5 million SEK to Prosolvia’s bankruptcy estate (Affärsvärlden, 2013).
2.3.2 Eniro

In the 5th of September 2014, Eniro’s top management team announced that they had found major accounting errors in the company’s financial reports (Micanovic, 2014). The majority of the errors were related to the revenue, where several entries had been incorrectly accrued (Dagens Nyheter, 2014). Eniro’s former CEO, Johan Lindgren, was accused of being responsible for the accounting errors (Micanovic, 2014). Furthermore, Eniro’s auditing firm during this time, PwC, was accused of ignoring large errors in Eniro’s annual report and the two auditors signing the report got involved in an investigation by Revisorsinspektionen (Swedish Inspectorate of Auditors) (Helander, 2014; Kuriren, 2014).

On the day it was announced that Eniro was accused of committing accounting fraud, Eniro’s own share prices dropped with 25 % already at the market opening (Dagens Industri, 2014). At the end of that day, its share prices had dropped 36 % in total, which upset several investors (Makar, 2014).
3 Research methodology

This section describes how the study collects data and selects samples. The section also explains why and how the study adopts the event study methodology.

3.1 Data collection

The study collects two sets of samples; sample A and sample B. Sample A refers to companies that were listed on the Swedish stock exchange, Nasdaq, and operated in the same industry sector as Prosolvia, the technology sector, during the first event study period investigated (Figure 2). Sample B includes the companies that were listed on the Swedish stock exchange and operated in the same industry sector as Eniro, namely the consumer services sector, during the second event study period investigated (Figure 3). For each company in sample A and sample B, the study collects the following data: company name, company trading code, share prices for the days in the event study period and auditing firm.

The study collects the daily closing share prices of the companies in the two samples for one year before and one year after the event date. The study collects daily data instead of monthly data since past research has shown that this results in more accurate measurements of abnormal returns and since daily returns show more frequent changes compared to monthly returns (French, Schwert & Stambaugh, 1987; Kothari & Warner, 2007).

Several of the companies in the samples have both A and B shares listed on the Swedish Stock Exchange. The study conducted a preliminary test by comparing the graphs of historical trading of A shares and B shares on Nasdaq. The study did not find much difference between these graphs, apart from that B shares are more frequently traded. Since the study wants to investigate the stock market’s reactions to new information, the B shares are collected since the most traded shares also will show the most distinct reactions. In addition, for some of the companies, such as Betsson AB, the B shares are the only type of shares available. Hence, it could be argued that B shares give a more comparable view among the companies.
The study also collects the OMX index for Swedish listed companies from Nasdaq for both of the event study periods, in order to calculate the return for the market. The OMX index is chosen since all of the companies in the samples are included in this index.

3.1.1 Sample A: Prosolvia

The study chooses to investigate the announcement of PwC’s payment obligation to Prosolvia’s bankruptcy estate and the event date is the 24th of September 2013.

The study collects all 35 companies from Nasdaq that operate in the same sector as Prosolvia, the technology sector. Out of these companies, the study excludes 10 companies because these were not listed during the entire event study period, namely between the 24th of September 2012 and the 24th of September 2014. Another 2 companies are excluded because their annual reports for 2013 could not be found. The study identifies the companies’ respective auditing firms from the “audit report” section in the companies’ annual reports from 2013. The study needs this information when it compares the share prices of the group of companies that were audited by PwC with the share prices of the group of companies that were audited by another auditing firm during the time of the announcement.

The remaining 23 companies are included in sample A. A list of the companies and information about which of the companies in the sample that were audited by PwC can be found in Appendix A.

3.1.2 Sample B: Eniro

The study also chooses to investigate the announcement where Eniro was accused of committing accounting fraud and the event date is the 5th of September 2014.

The study collects all companies listed on Nasdaq that operate within the same industry sector as Eniro, the consumer services sector, which results in 37 companies. Out of these companies, the study excludes 16 companies because they were not listed during both the estimation window and the post event window, namely during the period ranging between the 5th of September 2013 and the 4th of September 2015. The study also excludes 1 company because its annual report for 2014 could not be found. As with the data collection for Prosolvia, the
study identifies the companies’ respective auditing firms from the “audit report” section in the companies’ annual reports from 2014.

The study adds the remaining 20 companies to sample B. A list of the companies and information about which of the companies in the sample that were audited by PwC can be found in Appendix B.

3.2 Methods

In order to answer the research questions, the study conducts two sets of tests. The first test is applied to the individual companies in the samples and shows how and if the share prices of these companies were affected by the announcements connected to Prosolvia and Eniro. The study uses the second test to investigate if the share prices of the group of companies that were audited by the same auditing firm as Prosolvia and Eniro, PwC, during the event window were differently affected by the announcements compared to the share prices of the group of companies audited by another auditing firm.

With regards to the studies conducted by Jamal, Liu and Luo (2018), Bhasin (2013), Kang (2008) and Gleason, Jenkins and Johnson (2008), which were discussed in the literature review, the study expects to find that negative announcements about Prosolvia and Eniro would have a negative effect on the share prices of companies connected to Prosolvia and Eniro. Moreover, Agrawal and Cooper (2017) and Bhasin (2013) discussed the auditing firm’s involvement in accounting fraud and also possible negative consequences for the auditing firm, such as a bad reputation and replacements. According to Beatty, Bunsis and Hand (1998) the reputation of an underwriter and the reputation of the underwriter’s clients are positively related in the sense that negative announcements regarding a firm’s underwriter also will have a negative impact on the firm. With regards to this and since PwC was criticized in both the announcements connected to Prosolvia and Eniro, it seems reasonable to believe that the share prices of PwC’s other clients should be negatively affected as well. Hence, the study expects to see statistically significant results and rejections of the null hypotheses.
### 3.2.1 Event study methodology

The study opts to use the event study methodology, as it has been applied in similar studies within the field of accounting (Jamal, Liu & Luo, 2018; Kang, 2008, Palmrose, Richardson & Scholz, 2004).

This study uses the event study methodology to test whether an announcement connected to accounting fraud involving one company will have any effect on the share prices of other companies that operate within the same industry sector and are audited by the same auditing firm as the company involved in the announcement. Hence, the study investigates how Nasdaq OMX reacts to unexpected announcements concerning accounting fraud. The study considers the events investigated in the study as unexpected events since no information about these had been released to the public through media before the event date, such as in newspapers.

#### Figure 2. Event study period for Prosolvia

![Event study period for Prosolvia](image)

#### Figure 3. Event study period for Eniro

![Event study period for Eniro](image)

The event date corresponds to the date when the information in the investigated announcements became available to the public, for example through articles in the newspapers Dagens Nyheter and Kuriren. For Prosolvia, this information became known to the public on the 24th of September 2013, which also is the event date for Prosolvia (Figure 2). For Eniro, the
information became public on the 5th of September 2014 and therefore this is the event date for Eniro (Figure 3).

The event window for Prosolvia starts at the 20th of September 2013 and ends at the 26th of September 2013 (Figure 2). The event window for Eniro starts at the 3rd of September 2014 and ends at the 9th of September 2014 (Figure 3). The event window represents the period ranging from two trading days before the announcement date to two trading days after the date of the announcement. These event windows consist of seven days instead of five, since one weekend is included in both of the two event windows. The study uses short event windows because the event dates could be identified accurately through the announcements in newspapers. Armitage (1995) suggests that short event windows lead to more reliable abnormal returns. Furthermore, the study uses short event windows because they can more easily be connected to the efficient market hypothesis and the risk of confounding effects decreases (Ding et al., 2018).

The estimation window for Prosolvia ranges from the 24th of September 2012 to the 20th of September 2013 (Figure 2). The estimation window for Eniro ranges from the 5th of September 2013 to the 3rd of September 2014 (Figure 3). The estimation window is needed in order to be able to calculate the normal prices for the event window following the estimation window (Kang, 2008). For both Prosolvia and Eniro, the estimation window corresponds to the share prices of the companies in the samples for one year, which in this case corresponds to 249 trading days, before the date of the announcement. Armitage (1995) stated that a sufficient estimation window is between 100-300 trading days and 250 trading days, which usually corresponds to one year, is the most common length to use. Therefore this study uses an estimation window of one year, which in this case corresponds to 249 trading days.

3.2.2 CAR calculations for individual companies

The study first collects the share prices of the OMX index and the share prices of the companies included in sample A and sample B and then converts them into returns since returns should be used instead of prices when event studies are conducted. The study converts as follows:
\[ R_{i,t} = \frac{\text{price}_{i,t} - \text{price}_{i,t-1}}{\text{price}_{i,t-1}} \]  
(Equation 1)

\[ i = 1, ..., n, \text{the number of a company} \]
\[ t = 1, ..., \text{day in the estimation window} \]
\[ R_{i,t} = \text{Return on the } i^{th} \text{ company at time } t \]

The study uses the market model, shown in Equation 2, to estimate the normal, or expected, returns (Kothari & Warner, 2007). The market model is one of the models that have been widely used in similar studies to calculate the expected returns, for instance by Brown and Warner (1980), Kang (2008), Jamal, Liu and Luo (2018), and it is also the model that was first introduced by Fama et al. (1969).

The study estimates the expected returns based on the returns from the estimation window, as can be seen in figure 2 and 3:

\[ E(R_{it}) = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \]  
(Equation 2)

\[ i = 1, ..., n, \text{the number of a company} \]
\[ t = \text{day in the estimation window} \]
\[ E(R_{it}) = \text{expected return on the } i^{th} \text{ company at time } t \]
\[ \alpha_i = \text{intercept term} \]
\[ \beta_i = \text{slope} \]
\[ R_{mt} = \text{rate of return on market at time } t \]
\[ \epsilon_{it} = \text{error term} \]

Through the regression analyses in equation 2, the study tests daily returns in the estimation window of one company against the OMX index, in order to obtain the intercept and slope for this company.

The study then calculates the abnormal returns, \( AR_{it} \), for the days in the event window as follows:

\[ AR_{it} = R_{it} - E(R_{it}) \]  
(Equation 3)
\[ i = 1, \ldots, n \text{, the number of a company} \]
\[ t = \text{day in the event window} \]
\[ R_{it} = \text{Return on the } i^{th} \text{ company at time } t \]
\[ E(R_{it}) = \text{expected return on the } i^{th} \text{ company at time } t \]
\[ AR_{it} = \text{abnormal return on the } i^{th} \text{ company at time } t \]

The study calculates the cumulative abnormal returns, \( CAR_i \), for each company in sample A and sample B for the days in the event window, as follows:

\[ CAR_{i(t_1,t_2)} = \sum_{t=1}^{n} AR_{it} \]  \hspace{1cm} (Equation 4)

\[ i = 1, \ldots, n \text{, the number of a company} \]
\[ t = \text{day in the event window} \]
\[ t_1 = 2 \text{ days before the event date} \]
\[ t_2 = 2 \text{ days after the event date} \]
\[ n = \text{number of days in the event window} \]
\[ AR_{it} = \text{abnormal return on the } i^{th} \text{ company at time } t \]
\[ CAR_{i(t_1,t_2)} = \text{cumulative abnormal return on the } i^{th} \text{ company from day } t_1 \text{ to } t_2 \]

Next, the study estimates the t-statistic associated with each \( CAR_{i(t_1,t_2)} \), as follows,

\[ t - \text{statistic} = \frac{CAR_{i(t_1,t_2)}}{\sqrt{L\sigma^2(AR_i)}} \]  \hspace{1cm} (Equation 5)

\[ i = 1, \ldots, n \text{, the number of a company} \]
\[ t_1 = 2 \text{ days before the event date} \]
\[ t_2 = 2 \text{ days after the event window} \]
\[ L = \text{horizon length of event window, } 5 \text{ days} \]
\[ \sigma^2(AR_i) = \text{variance of the abnormal returns, } AR, \text{ of the } i^{th} \text{ company} \]
\[ CAR_{i(t_1,t_2)} = \text{cumulative abnormal return on the } i^{th} \text{ company from day } t_1 \text{ to } t_2 \]
Next, the study tests the null hypothesis at the two-tailed 5% significance level by rejecting or not rejecting the null hypotheses below.

\[ H_0: CAR_{i(t_1,t_2)} = 0 \]
\[ H_1: CAR_{i(t_1,t_2)} \neq 0 \]

\( H_{0P1} \): Share prices of the individual companies connected to Prosolvia are not affected by the announcement of PwC’s payment obligation to Prosolvia’s bankruptcy estate.

\( H_{0E1} \): Share prices of the individual companies connected to Eniro are not affected by the announcement where Eniro is accused of committing accounting fraud.

The study compares the CAR t-test value for each company in sample A and sample B with the critical value obtained from a t-distribution table, using n-1 degrees of freedom.

3.2.3 CAAR calculations for company groups

The study calculates the t-statistic for the difference in cumulative average abnormal return between the two company groups in sample A and sample B. The company groups in each sample correspond to the group of companies audited by PwC and the group of companies not audited by PwC. The study calculates the average abnormal return of all companies in the two samples at a given time, t, for example for the 5th of September 2014, as follows:

\[ AAAR_t = \frac{1}{n} \sum_{i=1}^{n} AR_{it} \]

(Equation 6)

\( i = 1, \ldots, n \), the number of a company
\( t = \) day in the event window
\( n = \) number of companies in the company group
\( AR_{it} = \) abnormal return on the \( i^{th} \) company at time \( t \)
\( AAAR_t = \) average abnormal return at time \( t \)
Next, the study estimates the cumulative average abnormal return over the event window for the two groups in the two samples, by using the formula:

\[
CAAR_{(t_1,t_2)} = \sum_{t=t_1}^{t_2} AAR_t \tag{Equation 7}
\]

\( t = \text{day in the event window} \)

\( t_1 = 2 \text{ days before the event date} \)

\( t_2 = 2 \text{ days after the event window} \)

\( AAR_t = \text{average abnormal return at time } t \)

\( CAAR_{(t_1,t_2)} = \text{cumulative average abnormal return from day } t_1 \text{ to } t_2 \)

The cumulative average abnormal return is the sum of the average abnormal returns for the days in the event window.

Thereafter, the study calculates the t-statistic for the difference in cumulative average abnormal return between the company groups in each sample, as follows:

\[
t - \text{statistic} = \frac{CAAR_{PwC} - CAAR_{NoPwC}}{\sqrt{\frac{\sigma^2_1}{n_1} + \frac{\sigma^2_2}{n_2}}}
\]

\( \sigma^2_1 = \text{variance of } CAR_{i(t_1,t_2)} \text{ of the companies audited by PwC} \)

\( \sigma^2_2 = \text{variance of } CAR_{i(t_1,t_2)} \text{ of the companies not audited by PwC} \)

\( n_1 = \text{number of companies audited by PwC} \)

\( n_2 = \text{number of companies not audited by PwC} \)

\( CAAR_{PwC} = \text{cumulative average abnormal return for the group of companies audited by PwC} \)

\( CAAR_{NoPwC} = \text{cumulative average abnormal return for the group of companies not audited by PwC} \)

Next, the study tests the null hypothesis at the two-tailed 5% significance level by rejecting or not rejecting the null hypotheses below.
$H_0$: $\text{CAAR}_{PwC} - \text{CAAR}_{NoPwC} = 0$

$H_1$: $\text{CAAR}_{PwC} - \text{CAAR}_{NoPwC} \neq 0$

$H_{0P2}$: Share prices of companies within the technology sector that are audited by PwC are not differently affected by the announcement of PwC’s payment obligation to Prosolvia’s bankruptcy estate compared to the share prices of companies audited by another auditing firm.

$H_{0E2}$: Share prices of companies within the consumer services sector that are audited by PwC are not differently affected by the announcement where Eniro is accused of committing accounting fraud compared to the share prices of companies audited by another auditing firm.

The study compares the calculated t-value for each sample with the critical value obtained from a t-distribution table, using $n-2$ degrees of freedom.

### 3.3 Confounding effects

In order to avoid inadequate results due to confounding effects, the study investigates possible confounding effects on the macroeconomic level by investigating changes in the repo rate\(^1\), the company tax rate and the real estate tax rate during the event windows. The study uses the website of Sveriges Riksbank (The Swedish central bank) to look for possible changes in the Swedish repo rate and the website of Skatteverket (Swedish Tax Agency) to look for possible changes in the company tax rate and the real estate tax rate.

Moreover, the study also investigates confounding effects on the company level if any company in sample A or sample B shows statistically significant results. This is done by searching for news about these companies that were published during the event window.

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\(^1\) “The repo rate is the rate of interest at which banks can borrow or deposit funds at the Riksbank for a period of seven days” (Sveriges Riksbank, 2019).
4 Results

This section presents and explains the results from the empirical study. The presented results are the t-statistic for the cumulative abnormal return for the individual companies in the samples and the t-statistic for the difference in cumulative average abnormal returns between the two groups in each sample. This section also presents the results from the research about possible confounding effects during the event window.

4.1 Results for individual companies

The study uses the results below in order to reject or not reject the following null hypotheses:

\[ H_0: CAR_{(t_1,t_2)} = 0 \]
\[ H_1: CAR_{(t_1,t_2)} \neq 0 \]

\( H_{0\text{P1}} \): Share prices of the individual companies connected to Prosolvia are not affected by the announcement of PwC’s payment obligation to Prosolvia’s bankruptcy estate.

\( H_{0\text{E1}} \): Share prices of the individual companies connected to Eniro are not affected by the announcement where Eniro is accused of committing accounting fraud.

Table 1. CAR (-2,2) results for sample A

<table>
<thead>
<tr>
<th>Name</th>
<th>CAR Value</th>
<th>CAR t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anoto Group</td>
<td>0.073</td>
<td>0.644</td>
</tr>
<tr>
<td>I.A.R Systems Group</td>
<td>0.022</td>
<td>0.638</td>
</tr>
<tr>
<td>Micro Systemation B</td>
<td>-0.001</td>
<td>-0.009</td>
</tr>
<tr>
<td>DORO</td>
<td>0.062</td>
<td>1.290</td>
</tr>
<tr>
<td>Hexagon B</td>
<td>-0.002</td>
<td>-0.073</td>
</tr>
<tr>
<td>MultiQ International</td>
<td>0.099</td>
<td>0.688</td>
</tr>
<tr>
<td>Proact IT Group</td>
<td>0.017</td>
<td>0.368</td>
</tr>
<tr>
<td>Softronic B</td>
<td>-0.031</td>
<td>-0.688</td>
</tr>
<tr>
<td>ZetaDisplay</td>
<td>-0.007</td>
<td>-0.068</td>
</tr>
<tr>
<td>Empir Group B</td>
<td>-0.025</td>
<td>-0.481</td>
</tr>
</tbody>
</table>
Table 1 presents the value of the cumulative abnormal return and the estimated t-statistic for the cumulative abnormal return for each company in sample A for the 5 days in the event window (CAR(-2,2)). These 5 days correspond to 2 trading days before the event date, the event date and 2 trading days after the event date (Figure 2).

Sample A has 23 observations, thus the number of degrees of freedom is 22. Hence, for a 2-tailed significance test and with a 5 % significance level, the study obtains a positive critical value from a t-distribution table of 2.074 and a negative critical value of -2.074 for sample A. If a calculated t-value for a company connected to Prosolvia is larger than the positive critical value or smaller than the negative critical value, the null hypothesis is rejected.

The study does not reject the null hypothesis, $H_{0P1}$, at a 5 % significance level for any of the companies connected to Prosolvia, since all companies have CAR t-test values lower than the positive critical value of 2.074 or higher than negative critical value of -2.074 (Table 1).
Table 2. CAR (-2,2) results for sample B

<table>
<thead>
<tr>
<th>Name</th>
<th>CAR Value</th>
<th>CAR t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betsson AB</td>
<td>-0.019</td>
<td>-0.580</td>
</tr>
<tr>
<td>BYGGmax Group AB</td>
<td>-0.051</td>
<td>-1.576</td>
</tr>
<tr>
<td>SAS AB</td>
<td>-0.010</td>
<td>-0.161</td>
</tr>
<tr>
<td>Swedol AB</td>
<td>-0.056</td>
<td>-1.286</td>
</tr>
<tr>
<td>Venue Retail Group AB</td>
<td>0.019</td>
<td>0.245</td>
</tr>
<tr>
<td>Clas Ohlson</td>
<td>-0.005</td>
<td>-0.120</td>
</tr>
<tr>
<td>Hennes och Mauritz</td>
<td>0.001</td>
<td>0.044</td>
</tr>
<tr>
<td>ICA Gruppen</td>
<td>0.002</td>
<td>0.123</td>
</tr>
<tr>
<td>Kappahl</td>
<td>0.007</td>
<td>0.198</td>
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<td>-0.623</td>
</tr>
<tr>
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<td>-1.195</td>
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<td>0.144</td>
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<tr>
<td>Qliro Group</td>
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<tr>
<td>Radisson Hospitality</td>
<td>-0.065</td>
<td>-1.701</td>
</tr>
<tr>
<td>RNB RETAIL AND BRANDS</td>
<td>-0.037</td>
<td>-0.666</td>
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<tr>
<td>SkiStar</td>
<td>-0.015</td>
<td>-0.504</td>
</tr>
<tr>
<td>Axfood</td>
<td>-0.007</td>
<td>-0.273</td>
</tr>
<tr>
<td>Bilia</td>
<td>0.007</td>
<td>0.174</td>
</tr>
<tr>
<td>Modern times group B</td>
<td>0.014</td>
<td>0.552</td>
</tr>
<tr>
<td>Tradedoubler</td>
<td>0.033</td>
<td>0.727</td>
</tr>
</tbody>
</table>

Table 2 presents the value of the cumulative abnormal return and the estimated t-statistic for the cumulative abnormal return for each company in sample B for the 5 days in the event window (CAR(-2,2)). These 5 days corresponds to 2 trading days before the event date, the event date and 2 trading days after the event date (Figure 3).

Sample B contains 20 observations, hence the number of degrees of freedom is 19. For a 2-tailed significance test and with a significance level of 5 %, the study obtains a positive critical value of 2,093 and a negative critical value of -2,093 from a t-distribution table for sample B.
If a calculated t-value for a company connected to Eniro is larger than the positive critical value or smaller than the negative the critical value, the null hypothesis is rejected.

In sample B, none of the 20 companies has a CAR t-test value higher than the positive critical value of 2,093 or lower than the negative critical value of -2,093 (Table 2). Therefore, the study does not reject the null hypothesis, \( H_{0E1} \), at a 5% significance level for any of the companies in the sample connected to Eniro.

### 4.2 Comparison between company groups

The study uses the results below in order to reject or not reject the following null hypotheses:

\[
H_0: CAAR_{PwC} - CAAR_{NoPwC} = 0 \\
H_1: CAAR_{PwC} - CAAR_{NoPwC} \neq 0
\]

\( H_{0P2} \): Share prices of companies within the technology sector that are audited by PwC are not differently affected by the announcement of PwC’s payment obligation to Prosolvia’s bankruptcy estate compared to the share prices of companies audited by another auditing firm.

\( H_{0E2} \): Share prices of companies within the consumer services sector that are audited by PwC are not differently affected by the announcement where Eniro is accused of committing accounting fraud compared to the share prices of companies audited by another auditing firm.

#### Table 3. CAAR value comparison between the two company groups in sample A

<table>
<thead>
<tr>
<th>Auditing firms</th>
<th>n</th>
<th>Event window</th>
<th>CAAR</th>
<th>Standard deviation</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>PwC</td>
<td>11</td>
<td>(-2, 2)</td>
<td>0,024</td>
<td>0,045</td>
<td></td>
</tr>
<tr>
<td>No PwC</td>
<td>12</td>
<td>(-2, 2)</td>
<td>0,013</td>
<td>0,049</td>
<td></td>
</tr>
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</table>

The scope of the test is to find out whether the share prices of companies that used PwC were differently affected by the announcement of PwC’s payment obligation to Prosolvia’s bankruptcy estate than the share prices of the companies that used another auditing firm. The
term event window in table 3 represents the 5 trading days included in the event window, ranging from -2 to 2, where -2 means two days before the event date and 2 means two days after the event date (Figure 2).

Table 3 presents the cumulative average abnormal returns for the two different groups of companies within sample A, namely the companies that used PwC as their auditing firm and the companies that used another auditing firm during the time of the announcement. Table 3 also shows the difference in cumulative average abnormal returns between the two groups of companies and also the t-statistic for this difference. With two groups of companies including 11 and 12 observations respectively, the degrees of freedom is 21. For a 2-tailed significance test and with a 5% significance level, the study obtains a positive critical value of 2,080 and a negative critical value of -2,080 from a t-distribution table. The study does not reject the null hypothesis, $H_{0P2}$, since $0.601 < 2.080$. Hence, the share prices of companies audited by PwC during the event window were not differently affected than the share prices of companies audited by another auditing firm.

Table 4. CAAR value comparison between the two company groups in sample B

<table>
<thead>
<tr>
<th>Auditing firms</th>
<th>n</th>
<th>Event window</th>
<th>CAAR</th>
<th>Standard deviation</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>PwC</td>
<td>5</td>
<td>(-2, 2)</td>
<td>-0.023</td>
<td>0.031</td>
<td></td>
</tr>
<tr>
<td>No PwC</td>
<td>15</td>
<td>(-2, 2)</td>
<td>-0.011</td>
<td>0.026</td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td></td>
<td></td>
<td>-0.012</td>
<td></td>
<td>-0.850</td>
</tr>
</tbody>
</table>

Again, the purpose of the test is to find out whether the share prices of companies audited by PwC were differently affected by the announcement where Eniro was accused of committing accounting fraud, compared to the share prices of companies that used another auditing firm. The term event window in table 4 represents the 5 trading days in the event window (Figure 3).

Table 4 presents the cumulative average abnormal returns for the two different groups of companies within the Eniro sample, namely the companies audited by PwC and the companies that used another auditing firm during the time of the announcement. Table 4 also shows the
difference in cumulative average abnormal returns between the two groups of companies and also the t-statistic for this difference. With two groups of companies including 5 and 15 observations respectively, the degrees of freedom is 18. For a 2-tailed significance test and with a 5% significance level, the study obtains a positive critical value of 2,101 and a negative critical value of -2,101 from a t-distribution table. The study does not reject the null hypothesis, $H_{0E2}$, since -0.850 > -2.101. Hence, the share prices of companies audited by PwC during the event window were not differently affected than the share prices of companies audited by another auditing firm.

4.3 Confounding effects

The study did not find any confounding effects on a macroeconomic level, namely changes in the Swedish repo rate, the company tax rate or the real estate tax rate, during the event windows for Prosolvia and Eniro. The event window for Prosolvia is between 20/9 2013 and 26/9 2013 (Figure 2) and the repo rate during these dates was 1,00% both right before, right after and during the event window (Sveriges Riksbank, 2019). Furthermore the company tax rate was 22%, right before, right after and during the event window and the different real estate tax rates were also constant right before, right after and during the event window (Skatteverket, n.d-a). The event window for Eniro is between 3/9 2014 and 9/9 2014 (Figure 3). The repo rate during these dates was 0.25% (Sveriges Riksbank, 2019) and the company tax rate was 22% right before, right after and during the event window and the different real estate tax rates were consistent during the event window (Skatteverket, n.d-b).

The study did not find any statistically significant results for any of the individual companies in sample A and sample B. Hence, the study did not make any investigation about possible confounding effects on the company level.
5 Analyses

In this section, the study analyses the results obtained in the empirical research. The results are discussed with the literature review about confounding effects, efficient market hypothesis, event study methodology and company size as a basis for the discussion.

With regards to the studies discussed in the literature review, especially the studies conducted by Jamal, Liu and Luo (2018), Bhasin (2013), Kang (2008), Gleason, Jenkins and Johnson (2008), Agrawal and Cooper (2017) and Beatty, Bunsis and Hand (1998), the study expected to find that negative announcements about Prosolvia and Eniro would have negative effects on the share prices of companies connected to Prosolvia and Eniro. Hence, the study expected to obtain statistically significant results and rejections of the null hypotheses.

In spite of the stated expectations, the main finding in this study is that the null hypotheses could not be rejected. To clarify, this means that no statistically significant results promote that the share prices of the group of companies within the same industry sectors as Prosolvia and Eniro that are audited by PwC, are differently affected by the announcements compared to the share prices of companies that are audited by another auditing firm. Also, the share prices of the individual companies were not affected by the negative announcements either.

Below, the study states possible reasons, separately or combined, for not obtaining statistically significant results.

5.1 Confounding effects

McWilliams and Siegel (1997) explained that other events in the environment can cause a difference between the real results from the event and the results obtained in the study. For example, if the event investigated in this study results in decreases in stock returns, other positive events or announcements for the companies could trade-off these negative values, which results in non-statistically significant results. Hence, confounding effects could be one possible scenario that caused the non-statistically significant results obtained in this study.
Since the study has looked into different possible events on the macroeconomic level that would affect the samples, such as changes in repo rate or tax rate, without finding any changes, every single company must have specific positive events connected to them during the event window if the possible negative effects from the events investigated in this study should be outweighed. However, since all the companies in sample A and sample B showed non-statistically significant results, it is not reasonable to believe that confounding effects have been present during the event window for each individual company.

5.2 Efficient market hypothesis

As Malkiel and Fama (1970) stated, a market is efficient if it fully reflects all the information that is available. This means that a market that is not efficient, may not respond or may not respond quickly to new information. Thus, since the event windows in this study only has two trading days after the event dates, the changes in share prices need to be seen within only two trading days after the event happened and therefore the market has to be efficient if accurate or correct results should be obtained. However, the study chooses to use a short event window since this is more complied with the efficient market hypothesis as is stated by Ding et al. (2018). As the study mentioned earlier, another reason for choosing a short event window of only five days is to control as much as possible for confounding effects. However, although the study chooses such a short event window, confounding effects could have been present and therefore the existence of these can be a reason for not obtaining statistically significant results.

One of the most crucial assumptions regarding the method used in this study, the event study methodology, is that the efficient market hypothesis is true. However, as this study has explained earlier in section 2.1.1, the validity of the efficient market hypothesis has been widely discussed and investigated in different studies, for example by Malkiel and Fama (1970), Campbell and Schiller (1988), Tóth and Kertész (2006), Wilson and Marashdeh (2007) and Lee, Lee and Lee (2010). The discussion about the validity of the hypothesis has been going on since the 1980’s and the researchers within this topic have not yet reached a united opinion. Hence, if the parties that do not promote the existence of efficient markets are right, this may lead to invalid results in the study.

The random walk hypothesis is, as mentioned earlier, closely connected to the efficient market hypothesis and the random walk hypothesis needs to hold true for the efficient market
hypothesis to be valid. Frennberg and Hansson (1993) investigated the random walk hypothesis in Sweden and rejected the random walk hypothesis and therefore the efficient market hypothesis is also rejected. Hence, although studies conducted in other countries may promote the efficient market hypothesis, the stock market in Sweden may not be efficient and since this study is based on Swedish companies, this can be another reason for the non-statistically significant results obtained in the study.

As stated by Ţiţan (2015) and Hirshleifer, Hsu and Li (2013), investors may be inattentive to new information, which can cause an under-reaction in the stock market and also delayed share price changes. This inattention by investors could be a reason for that the study did not obtain any statistically significant results. The market may react less or later than it should to the new information in the announcements. Hence, more reactions perhaps would have been seen in the changes of share prices if a longer event window would have been used. However, this would also increase the risk of confounding effects, as has been discussed earlier.

5.3 Event study methodology

One of the crucial assumptions for the event study methodology is that the investigated event should be unexpected (McWilliams & Siegel, 1997). Hence, the market should be completely unaware of the information prior to the event. However, in the case of Prosolvia the investors might had anticipated the out of court settlement that led to PwC’s large payment obligation of 742,5 million SEK, since the accounting fraud was detected in 1998. Since the trial process lasted for 15 years, the capital markets had time to change to reflect the situation in the ongoing trial process.

The announcement connected to Eniro probably was more unexpected than the announcement connected to Prosolvia. The study has not found any information about the accounting fraud Eniro was accused of committing before the event date on the 5th of September 2014. In addition, the study has not found any signs of information leakages about the accounting fraud either. However, undetected leakages might be present anyway, for example if the auditing firm does not follow their mandatory confidentiality stated in ISA 200 (IAASB, 2009a). Although the Eniro event can be considered as more unexpected than the Prosolvia event, no large differences can be seen in the results from the two samples since the study did not reject any null hypothesis connected to Prosolvia or any null hypothesis connected to Eniro.
5.4 Company size

Restatements can be indications of accounting fraud and Gleason, Jenkins and Johnson (2008) concluded in their research that larger companies’ restatements has a bigger effect on the share prices of the non-restating companies in that industry, compared to smaller companies’ restatements. Hence, if Eniro and Prosolvia would have been larger companies during the times of the announcements, connected companies’ share prices may have been more affected as well.
6 Conclusion

The purpose with this study was to find out how companies’ share prices were affected by negative announcements that concerned a connected company. More specifically, this study researched negative announcements for two Swedish companies, Prosolvia and Eniro, and their effect on the share prices of companies that operated within the same industry sectors as Prosolvia and Eniro. The study also investigated if the share prices of these companies were differently affected if the companies were audited by the same auditing firm as Prosolvia and Eniro. Bhasin (2013) stated that the knowledge about the consequences of accounting fraud needs to be increased, in order to be able to decrease the risk of future accounting frauds. Moreover, there is a lack of research regarding how negative announcement connected to accounting fraud of one company affects connected companies and this area have not been investigated in Sweden before.

The study used the event study methodology in order to answer the research questions and the study concludes that individual companies connected to Eniro or Prosolvia were not affected by the negative announcements. Also, the study concludes that the share prices of companies audited by the same auditing firm as Prosolvia and Eniro were not differently affected by the negative announcements, compared to the share prices of companies audited by another auditing firm. The study extends the research field about consequences of accounting fraud by concluding that share prices of companies with connections to companies involved in negative announcements concerning accounting fraud, are not affected.
7 Discussion

*In this section the study describes the societal and ethical effects of the study and suggests how future researchers can extend this research field.*

7.1 Societal and ethical effects of the study

Several stakeholders, especially investors, obtain helpful information from a company’s financial statements. One of the purposes with the financial statements is to reflect the true picture of the company’s financial health (Ball, 2006). Hence, the investors expect the financial statements to fulfill this purpose and especially when these have been audited by an auditing firm, since one of the auditing firms’ duties is to increase the level of certainty concerning the financial statements validity (IAASB, 2009a). However, if managers choose to manipulate accounting policies or numbers in the financial statements, and if these are not detected by the company’s auditing firm, accounting fraud may be present. Such actions by managers and auditing firms will decrease society’s trust of companies and auditing firms. This can in turn lead to more negative share prices (Palmrose, Richardson and Scholz, 2004). In addition, accounting fraud can both harm the reputation of the auditing firm (Ball, 2009), the company involved in the fraud (Cox and Weirich, 2002) and several stakeholders such as investors, employees and suppliers (Coombs, 2007). One example is the Enron accounting fraud, where thousands of employees lost their jobs (Giroux, 2008).

The study did not find any statistically significant results showing that companies in the same industry are differently affected of an announcement if they use the same auditing firm as the company involved in the announcement. Hence, the study shows that the society not lose trust to companies, auditing firms and the functions of capital markets with regards to this aspect. However, the study has presented several other negative consequences for the society that arises from accounting fraud, such as unemployment and decreases in firm values.

7.2 Future studies

Since the results from this study is not in accordance with results from similar studies conducted in other countries, such as the study conducted by Jamal, Liu and Luo (2018), this area needs to be investigated further. In order to enhance the research field about how
connected companies are affected by announcements concerning another company´s accounting fraud, studies can be conducted in other countries and also with different types of announcements connected to accounting fraud as a basis. Moreover, the effect from other kinds of connections between companies can be studied. Gleason, Jenkins and Johnson (2008) stated that larger companies´ restatements has a bigger effect on share prices of the non-restating companies in that industry, compared to smaller companies´ restatements. This study was not able to find any announcement connected to accounting fraud committed by a larger company than Prosolvia and Eniro from the recent years, since Sweden was the basis for this study. However, if future studies use a broader geographical area as a starting-point, announcements concerning accounting fraud connected to larger companies most probably will be found. Moreover, if other studies do not focus on the investors, but on other stakeholders, the consequences from announcements concerning accounting fraud for other stakeholder groups can be studied, such as the effect on suppliers and customers.
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# Appendices

## Appendix A. Information about the sample connected to Prosolvia.

<table>
<thead>
<tr>
<th>Companies connected to Prosolvia</th>
<th>Company trading code</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anoto Group</td>
<td>SE0010415281</td>
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Appendix B. Information about the sample connected to Eniro.

<table>
<thead>
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<th>Company trading code</th>
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